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THE LONDON NATURALIST

The journal of the
LONDON NATURAL HISTORY SOCIETY

No 71

Published 1992
Price £4.00

LONDON NATURAL HISTORY SOCIETY

The Society welcomes new members, both beginners and experts. Its Area lies within a 20-mile (32-km) radius of St Paul's Cathedral and here most of its activities take place. Although much covered with bricks and mortar, it is an exciting region with an astonishing variety of flora and fauna. The Society comprises Sections whose meetings are open to all members without formality. For those interested in arachnology, archaeology, botany, conchology, conservation, ecology, entomology, geology, herpetology, mammalogy, ornithology, palaeontology or rambling, there is a Section ready to help.

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The London Naturalist, published annually, contains papers on the natural history and archaeology of the London Area, including records of plants and animals.

The *London Bird Report*, also published annually, contains the bird records for the London Area for each year, as well as papers on various aspects of ornithology.

Bulletins of news items, including the Society's *Newsletter, The London Atalanta* and the *Ornithological Bulletin*, are sent to members throughout the year.

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THE LONDON NATURALIST

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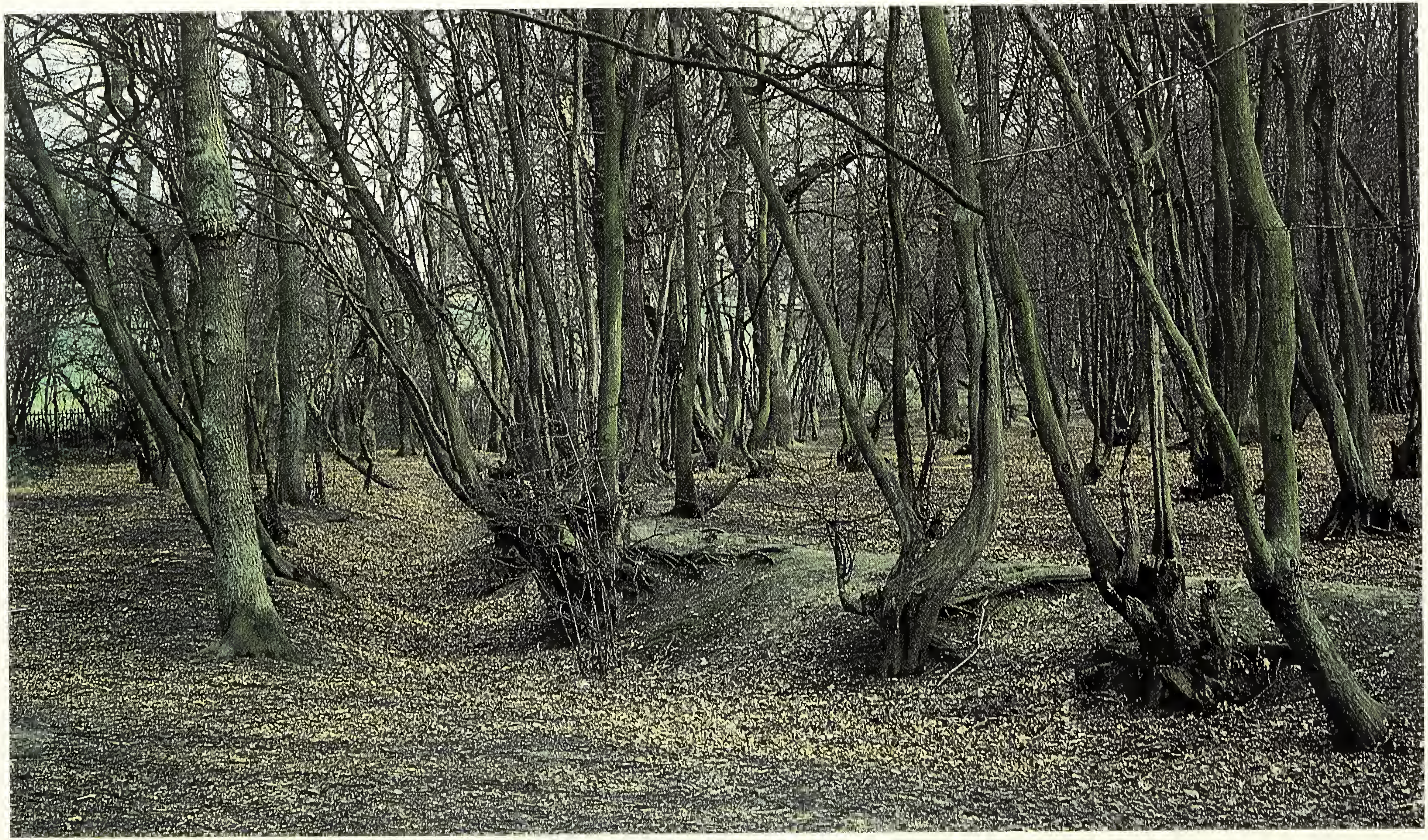

Coldfall Wood, Haringey, showing western boundary woodbank and ditch. *The London Naturalist, No. 71, 1992* *Photo: David Bevan*

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THE LONDON NATURALIST

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LONDON NATURAL HISTORY SOCIETY

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Requests for information should be made to the appropriate recorder.

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Report of the Society for 1991

(Presented at the Annual General Meeting on 31 March 1992)

It is with deep regret that we have to record the deaths of the following members:

R. F. Allen	Don Bowman
Mrs Olive Cassie	P. R. Greenwood
Eric Hosking	Miss E. L. Kirkby-Johnson
Miss Cynthia E. Longfield	Miss J. M. Page

Miss Longfield, who died in June 1991, joined the Society in 1926 and was our senior Honorary Vice-President. She retired to her family home in County Cork in 1957, but always had the interests of the Society close to her heart. A full obituary will appear in *The London Naturalist* to be published in the autumn of 1992.

Eric Hosking died in February 1991. He was also an Honorary Vice-President and an obituary was published in *The London Naturalist* No. 70. Olive Cassie and Don Bowman worked tirelessly for the Society for many years. The Society, and the natural history world in general, is the poorer for the loss of all those mentioned and we appreciate the work that they did for the Society.

This year has been a traumatic one for the senior officers of Council and officers of the Sections. For reasons outside the control of the office-holders, several important posts were vacated and appeals at meetings and in the *Newsletter* for volunteers to fill the vacancies met with limited response. It is likely that the membership at large, who continued to enjoy the Society's activities and to receive the *Programme* and other publications, was unaware of the difficulties being faced and overcome by a small but devoted band of officer-members, headed by our hard-working President. Fortunately things have now improved; Tony Barrett, a former Treasurer and President, has become General Secretary and Mike West has taken on the heavy responsibilities of Treasurer. The *London Bird Report* is now in the safe hands of Mark Hardwick. A new team of administrative officers is in place and the future in this area seems assured.

An encouraging increase in the number of new members enrolling (140 for the year, as compared with 115 for 1990) was sadly offset by losses due to death, resignation or non-payment. The overall number of members remains virtually unchanged at 1,081.

We are pleased to announce the appointment as Honorary Vice-Presidents of Brad Ashby, Rodney Burton and Margaret Kennedy. We hope that Brad will be quickly restored to full health.

The Society has continued to hold meetings, issue publications and to be involved in the natural history and conservation work of the Capital. Its aim continues to be, as always, to provide pleasure and help to its members and friends and to stimulate naturalists of all levels of ability and experience. It is customary to include within this report a short summary of the work of the various Sections of the Society.

Botany

A varied programme was arranged with an emphasis on field meetings and practical natural history. The workshops arranged by Messrs Burton, Holland and Page were well received.

Ecology and Entomology

The Section has been able to offer a varied selection of indoor and outdoor meetings. The Parmenter Lecture was given by Tom Langton whose paper on the herpetofauna of the London Area appeared in *The London Naturalist* No.

70. This journal also included the results of the recent surveys of the Auchenorhyncha (Hemiptera) and two divisions of the Aschelminthes. The Section remains a major contributor to the work at Bookham Common.

Geology

Field meetings have now been restored and indoor meetings continue with considerable variety.

Ornithology

The Section has organized a wide range of field meetings primarily within our own area but not exclusively so. A wide range of species was observed and leaders were able to assist less experienced birdwatchers. A varied programme of indoor meetings designed to cater for a wide range of ornithological tastes was well supported.

The Research Committee of the Section has focused its efforts on the collection of data to produce a Breeding Bird Atlas for the London Area. The fourth and hopefully final year of this project took place with some 400 volunteers surveying their local habitats within the LNHS area. During June and July some members took part in the Wildfowl and Wetlands Trust survey of introduced geese in the 10km squares covering Greater London and Middlesex. LNHS members located no less than 5,000 Canada geese and 260 greylag geese. A paper summarising the results of this survey and comparing these with the 1982-3 LNHS survey of Canada geese will be published in a future *London Bird Report.*

The Records Committee was busy during the year assessing records of birds seen in the LNHS Area. As in other years work on the *London Bird Report* is of major importance – members and ornithologists in general are now able to enjoy the volume published only recently.

Ramblers and Archaeology

A balanced programme has been provided, and whilst numbers attending meetings can always be improved upon those who did participate enjoyed what was offered.

South-West Middlesex

The Section continues to provide a locally balanced programme. Attendances at meetings have increased slightly and a joint meeting was held with the Spelthorne Natural History Society.

The Society has been active in promoting the principles which it supports and the benefits it offers to potential members. The new display stand spent the month of July in West Hampstead Library, showing 'Mammals in London' on one side and 'Birds in London' on the other. It then graced the Society's stall at the Amateur Entomologists' Society Exhibition, showing some very beautiful pictures of butterflies and dragonflies from slides by Brad Ashby, Ruth Day and Ray Softly. Our President, David Bevan, made various newspaper appearances; being pictured with bee orchids near the North Circular Road, and with the wall bedstraw rediscovered by Brian Wurzell after a 300-year absence from London. In November the *Evening Standard* reported the reappearance of 70 flowering plant species as a result of coppicing in Coldfall Wood, Muswell Hill.

The Society has continued with its work on the long-term survey at Bookham Common in Surrey. It will continue to publish the results of its practical work in *The London Naturalist.* The Society has suported the work of the Dungeness Bird Observatory and has made a contribution to the Dolphin Research Project.

The Society is always prepared to consider becoming involved at a practical level in research projects.

Our thanks go to all officers and sectional committees who work so hard for the Society. We thank Imperial College for allowing us to use their rooms and the staff at the College who care for the Society's Library.

Treasurer's Notes on the Annual Accounts for 1990–1991

(Presented at the Annual General Meeting on 31 March 1992. See also pp. 194-195)

In the financial year ended 30 June 1991 the Society's accounts show a surplus of £1,673 (after making provision for the diminution in the value of certain investments where the current market value is less than the book value). This compares with a surplus of £5,262 in 1989-90.

Total income was £29,798 compared with £34,560 in 1989-90, a fall of 14 per cent. This difference is more than accounted for by a reduction in profits from the sale of investments (which depend on the state of the market and the rate of turnover of our portfolio). Other investment income and interest, at £17,060, totalled 6 per cent more than in 1989-90. Income from subscriptions and donations was £10,457, almost the same as the previous year, and receipts from sales of publications and surplus items increased to £1,710 from £1,192 in 1989-90.

There was a 5 per cent reduction in overall expenditure, from £26,158 in 1989-90 to £24,755. Meetings costs, sectional and general expenditure (including depreciation of equipment costs) fell by £447 to £7,383, although within this total lecturers' fees and sectional expenses rose by 33 per cent. The net cost of producing the Society's publications remained broadly level; further savings from the use of advanced technology in printing the *London Bird Report* offset an increase in the cost of *The London Naturalist.*

Society Grants

The Society sets aside a small amount each year to assist conservation work, the establishment or maintenance of nature reserves and scientific investigation in the London Area. Applications for grants and loans are considered by the Administration and Finance Committee: enquiries should be addressed to its Secretary. Papers reporting results of research supported in this way must be submitted for publication in the Society's journals.

Book Review

A Botanist's Garden. By John Raven. Silent Books, Swavesey. 1992. 224 pp. £19.95. ISBN 1 85153 034 0.

When the first edition of *A Botanist's Garden* was published in 1971, it was an inspiration to many who would not otherwise have appreciated the great variety of interesting plants it was possible to grow within the confines of a fairly small garden on unpromising chalky soil, if you could only find them or were prepared to go and collect them. Now his widow has brought out a new edition. Times have changed more than the book has. Its original photographs have been lost, and as the captions of the colour plates, which had been printed in Japan, had been placed at the foot of the text on the facing page, the new edition without photographs has had to be freshly type-set. This created the opportunity of updating the botanical nomenclature, but I am not convinced that this was worth doing. Certainly names like *Dryopteris affinis*, which Raven cannot have known, strike a false note in his very personal text.

R. M. Burton

The Natural History of Haringey's Ancient Woodlands

By David Bevan*

(Presidential Address delivered at the Annual General Meeting on 31 March 1992)

The part of London which I know best is the Borough of Haringey. This is my home territory, where I have lived and worked since 1970 and where I am the Council's Conservation Officer. I had originally intended to cover the natural history of the Borough as a whole, but it quickly became apparent that this was too ambitious an undertaking for a short address, so I have restricted myself to a discussion of the natural history of Haringey's ancient woodlands. These are here defined as those known to have been present continuously since the year 1600.

The Borough of Haringey was created in 1965 and combines the old Urban District Councils of Hornsey, Wood Green and Tottenham. It is multicultural in character and geographically varied. Some 200,000 people inhabit 81,000 dwellings within its 30 square kilometres. The southern extremity of the Borough at Finsbury Park lies just five kilometres north of St Paul's Cathedral. Haringey lies wholly within the Watsonian Vice-County of Middlesex (V.C.21). The land falls away sharply from west to east, from the hilly areas around Highgate and Muswell Hill, where the Woods are found, to the flat low-lying land beside the River Lea.

Haringey is most fortunate in possessing no less than five distinct ancient woods. These are Highgate Wood, Queen's Wood, Coldfall Wood, Bluebell Wood and North Wood. All are shown on John Rocque's 1754 map of Middlesex. Their present positions are shown in Figure 1. The history of Highgate, Queen's and Coldfall Woods has been examined in some detail by Silvertown (1978), who used historical sources to show that the woodlands are likely to be of primary origin (i.e. continuously present since prehistoric times). The fourth wood, Bluebell Wood, though not mentioned directly by Silvertown is shown (unnamed) on several of the maps accompanying his paper; and is thought to have a similar early history to the three he describes. The fifth wood, North Wood, is part of the Kenwood Estate and has a rather different history. In historical times, traditional management practices have influenced the ecology of the Woods, and the purpose of *this* address is to examine aspects of their current natural history.

These five woods are among the most centrally placed ancient woodlands in London; Highgate, Queen's and North Wood being only eight kilometres from St Paul's Cathedral. Despite this, surprisingly little detailed work has been published on their natural history. They are essentially urban woodlands and inevitably suffer from higher levels of disturbance than their more rural counterparts. Nevertheless a surprising range of plants and animals is able to co-exist here with man and in recent years considerable efforts have been made to help conserve them.

Turning briefly to the geology, the underlying rock as in most of Haringey, is the London Clay. However there is also a significant overlying ridge of chalky boulder-clay fringed by glacial gravel which crosses the western edge of Coldfall Wood. Small pockets of glacial gravel outwash also occur in Highgate Wood which was called Gravel Pit Wood in the nineteenth century. A small part of the south-eastern corner of this wood is overlaid by the Claygate Beds. North Wood, by contrast, lies wholly on the Bagshot Sands.

*3 Queen's Road, London N11 2QJ.

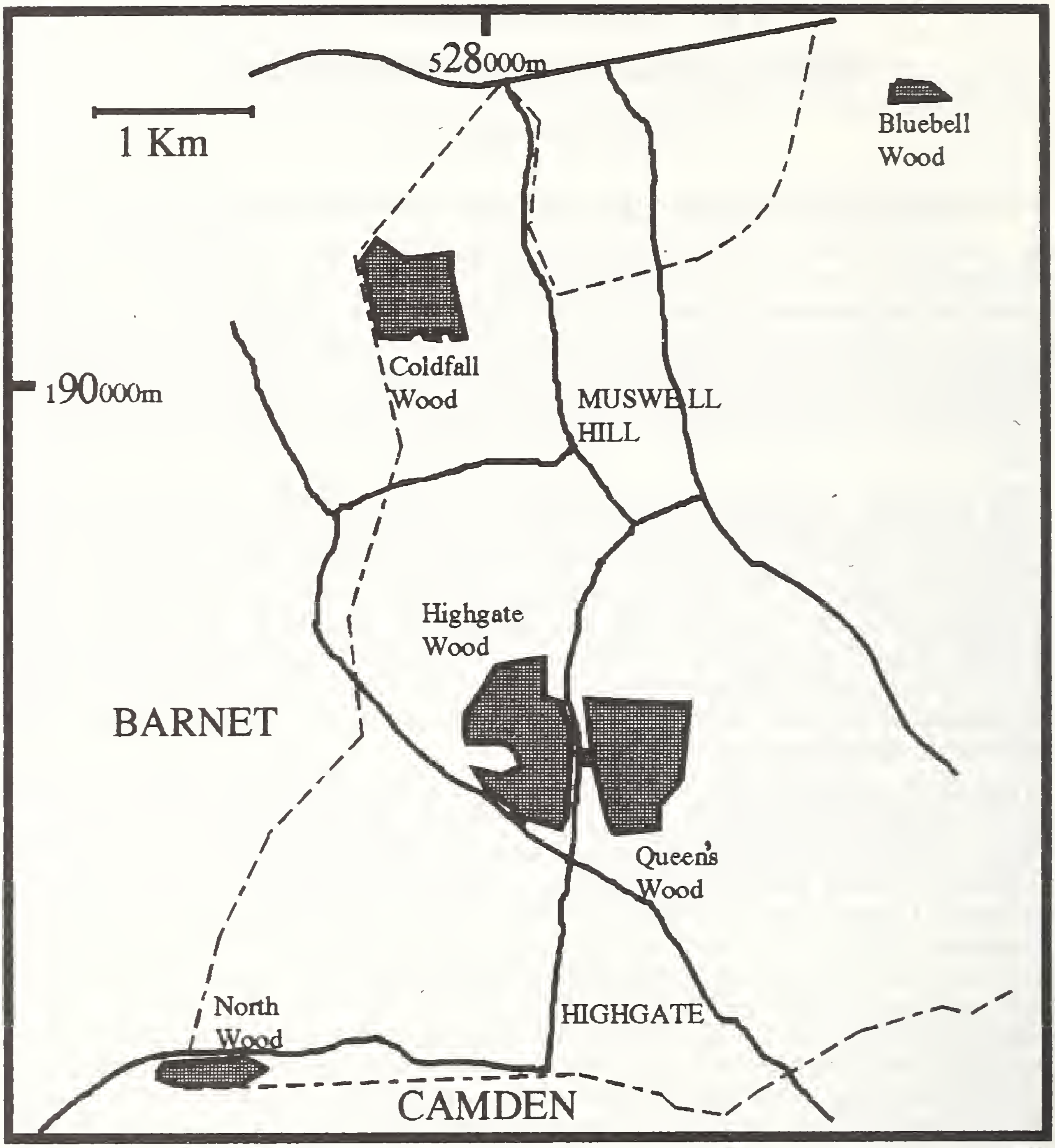

FIG. 1. West Haringey showing position of the Woods. Broken line, Borough boundary, solid lines, major roads.

With the exception of North Wood, all are oak–hornbeam woodlands. They fit most closely to Stand Type 9Ba, acid sessile oak–hornbeam woods (Peterken 1981), though today penunculate oak *Quercus robur* is also widespread in them all. Ingrouille and Laird (1986) suggested that sessile oak *Q. petraea* may have been the predominant species in the southern part of the old Forest of Middlesex, but that man's activities have favoured the penunculate oak in a haphazard way. They further suggested that there are few hybrids, but introgression in the distant past has made some populations more variable. My own observations confirm that the penunculate oak is the dominant tree in Queen's Wood, whereas sessile oak predominates in Bluebell Wood. Highgate and Coldfall Woods contain a mixture of both species. The Woods all have a past history of coppicing, hornbeam providing an important source of fuel for London. Using evidence from the seventeenth century court rolls of the Manor of Hornsey, Silvertown (1978) suggested that the woods were coppiced throughout in one season. The lack of any internal boundary banks in the Woods today supports this view. Coppicing was probably a regular practice in all the Woods until the mid nineteenth century when it slowly declined. Today the old hornbeam coppice poles have grown tall, forming a dense canopy in many places which excludes light from the woodland floor. As a direct consequence many parts of these Woods lack any sort of ground vegetation. This is particularly evident in Coldfall Wood. Nevertheless the sparse flora present is of considerable interest and contains a variety of plants known to be associated with ancient woodland. Perhaps the best-known of these is the wild service tree *Sorbus torminalis,* which has been recorded from them all. Midland hawthorn *Crataegus laevigata*, common hawthorn *C. monogyna*, and their hybrid *C.* × *macrocarpa*, are all widespread. Other trees include field maple *Acer campestre*, mountain ash *Sorbus aucuparia*, hazel *Corylus avellana*, holly *Ilex aquifolium*, cherry *Prunus avium* and both species of lowland birch *Betula pendula* and *B. pubescens.* Beech *Fagus sylvatica* is widespread though curiously rare in Coldfall Wood. Herbaceous species with a strong affinity for ancient woodland include wood anemone *Anemone nemorosa*, cow-wheat *Melampyrum pratense*, wood sorrel *Oxalis acetosella*, great woodrush *Luzula sylvatica*, wood millet *Milium effusum*, and a variety of sedges *Carex* spp.

Highgate Wood

Each Wood will now be discussed in turn, starting with Highgate Wood which is the largest (25 hectares), and probably best known. It is owned and managed by the Corporation of London, who acquired it from the Ecclesiastical Commissioners in 1886 at no charge on condition that it was 'maintained in perpetuity for the benefit of Londoners'. This the Corporation endeavoured to do according to the prevailing fashions of the day! Asphalt paths were laid down, ornamental trees were planted and dead wood was assiduously removed and burned. The Wood was managed more as an urban park than an ancient woodland (Figure 2) and its wildlife suffered accordingly. As long ago as 1916, the LNHS was reporting in its *Transactions* that 'Bluebells are practically non-

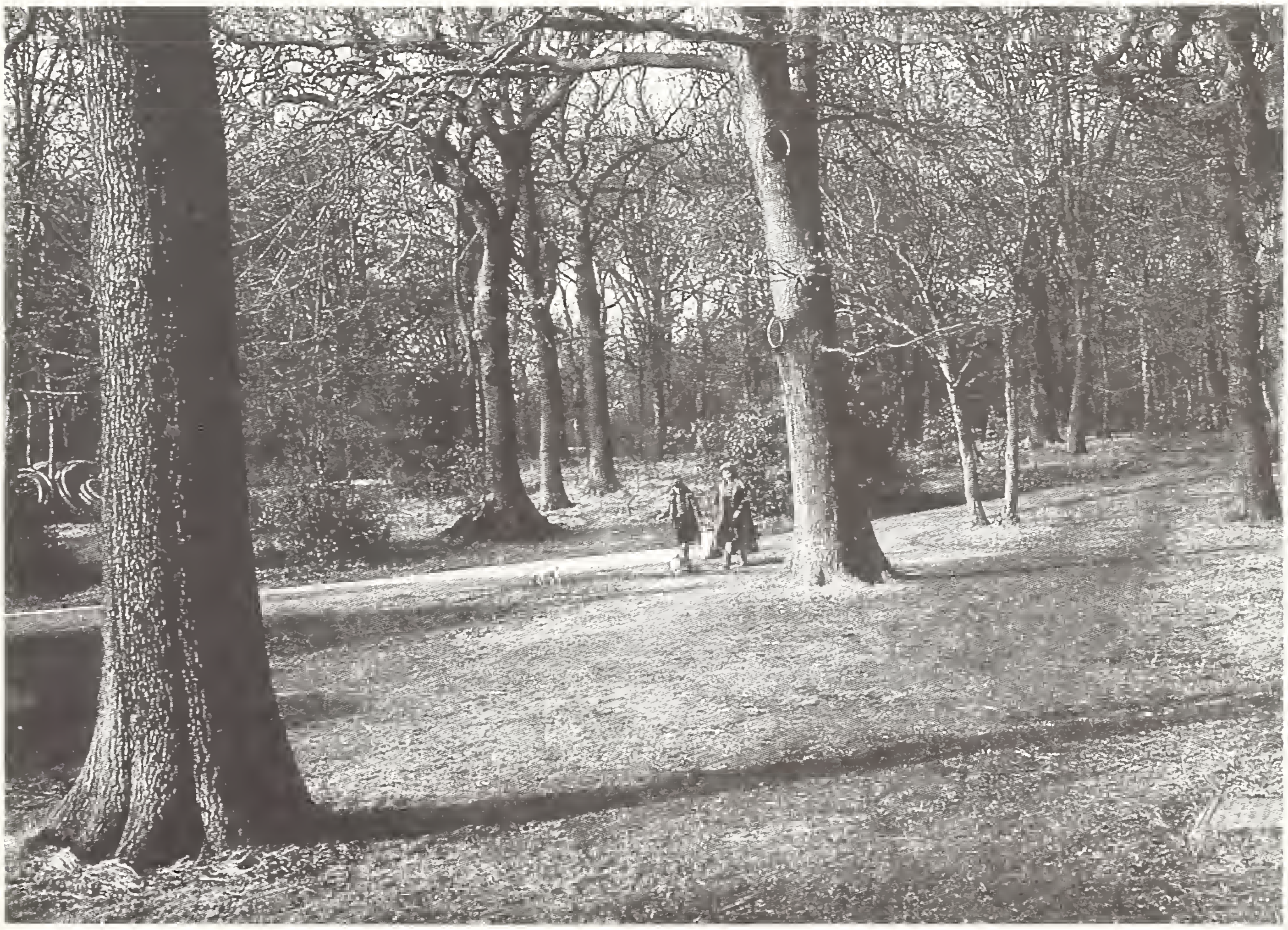

FIG. 2. Highgate Wood.

existent, and the thousands of wood anemones are now represented by a few miserable clumps of leaves here and there. The better drainage of the woods has destroyed numerous plants and several fine clumps of such plants as drooping sedge (*Carex pendula*) and bladder sedge (*C. vesicaria*) have been lost' (Nicholson 1916, quoted in Fitter 1945). Other losses have included heath cudweed *Gnaphalium sylvaticum*, pale sedge *C. pallescens* and the greater and lesser butterfly orchids *Platanthera chlorantha* and *P. bifolia*, which were all recorded from the wood in the nineteenth century (Kent 1975).

In 1968 the Conservation Committee of this Society expressed its concern at the planting of exotic conifers (Hersey 1969) which included Corsican pine *Pinus nigra* ssp. *laricia*, western hemlock *Tsuga heterophylla*, Norway spruce *Picea abies* and Douglas fir *Pseudotsuga menziesii*. Although these may encourage birds such as coal tits and goldcrests, they can hardly be considered appropriate species to plant into an ancient woodland. As a consequence of the Society's protest the planting programme was halted and there are no plans to continue the policy. Indeed in recent years management practices have become far more sympathetic to the Wood's wildlife. Publication of a comparative study of Highgate Wood and Queen's Wood (Latimer 1984) undoubtedly encouraged this welcome change. Many of Latimer's suggestions for future management have now been carried out. Certain areas have been fenced to allow the regeneration of the vegetation free of trampling, and dead wood is allowed to decay in situ – to the great benefit of saprophytic fungi and a wide range of invertebrates.

To celebrate the centenary of their ownership of Highgate Wood, the Corporation of London (1986) published a small booklet about the Wood. This includes a useful plant list compiled by Mike Mullin to which I have subsequently made additions. The native golden rod *Solidago virgaurea* hangs on along the western edge of the Wood. This is now very scarce in Middlesex – the golden rod most frequently seen being the introduced Canadian species *S. canadensis* – a plant of far wider ecological tolerance. The drooping sedge reported lost by Nicholson, has now returned with a vengeance and is likely to have originated from local gardens where it is sometimes grown as an ornamental. Also appended in the Corporation's booklet is a list of butterflies and moths recorded by Michael Hammerson in 1985. He has subsequently run a moth-trap in the Wood every year and recorded a total of 121 species. Butterflies include good populations of speckled wood *Pararge aegeria* which, in the early 1980s were virtually confined to this Wood, but which have subsequently spread throughout the Borough. The booklet also included a list of birds recorded from 1965 to 1985 and contains some remarkable records including golden oriole *Oriolus oriolus*, pied flycatcher *Ficedula hypoleuca*, barn owl *Tyto alba* and long-eared owl *Asio otus*. Palmer (1987) listed 25 species of breeding birds from Highgate and Queen's Woods in his survey of major London woodlands. This is a disappointingly low count which may reflect the high degree of human disturbance. By contrast, in the same survey, Sydenham Hill Wood (Southwark) which is 8.5 kilometres from St Paul's, was found to support 40 breeding species.

In his account of the 'Distribution and status of bats in the London Area', Mickleburgh (1987) lists four species from the Highgate Wood. These are pipistrelle *Pipistrellus pipistrellus*, Natterer's *Myotis nattereri*, the very rare Leisler's *Nyctalus leisleri* seen in 1986, and the noctule *Nyctalus noctula*. Bat boxes have been put up to encourage them.

Queen's Wood

Across Muswell Hill Road to the east lies Queen's Wood (21 hectares) which presents a number of contrasts to the Wood just described. In the nineteenth century Queen's Wood was known as Churchyard Bottom Wood, possibly because of the discovery of human bones in the west of the Wood which were thought to derive from a burial pit for victims of the 'Great Plague' of 1665. The Wood was purchased from the Ecclesiastical Commissioners by Hornsey Council in 1889 and renamed Queen's Wood in honour of Queen Victoria. The intensive management of the type practised at Highgate Wood was never implemented here and the wildlife has benefited in recent years from what might best be described as 'benign neglect'. In November 1990 it was designated a Statutory Local Nature Reserve by the Council. The London Ecology Unit lists it (together with Highgate Wood) as a Site of Metropolitan Importance, their highest grading. Bantock (1984) found a significantly greater number of ground-feeding birds present in the Wood when compared to Highgate Wood. He attributed this to the greater structural diversity and denser shrub layer present. There have been recent sightings of hawfinch *Coccothraustes coccothraustes* in February 1991 and April 1992 (George Newbiggin, pers. comm.). The latter record was of a pair and is strong evidence of breeding. I have no other recent records of this bird in Haringey.

The northern portion of the Wood is crossed by a small stream which provides the most diverse damp woodland community of any of the Woods described. Goldilocks buttercup *Ranunculus auricomus*, wood sorrel, yellow pimpernel *Lysimachia nemorum*, and square-stemmed St John's wort *Hypericum tetrapterum* occur here. I have not found them elsewhere in Haringey. The streamside also supports a small colony of lady fern *Athyrium felix-femina* which I have recently also found in Coldfall Wood and Bluebell Wood. Wood sedge *Carex sylvatica* and remote sedge *C. remota* are both frequent and there is also a small colony of great woodrush, but perhaps the most attractive woodland plant here is the wood anemone which covers the ground in white, snow-like drifts in the spring (Figure 3). There are occasional patches of common dog violet *V. riviniana* and, in one place only, these are accompanied by a sizeable colony of the early dog violet *V. reichenbachiana.*

The Great Storm of 1987 brought down many trees. In retrospect this has

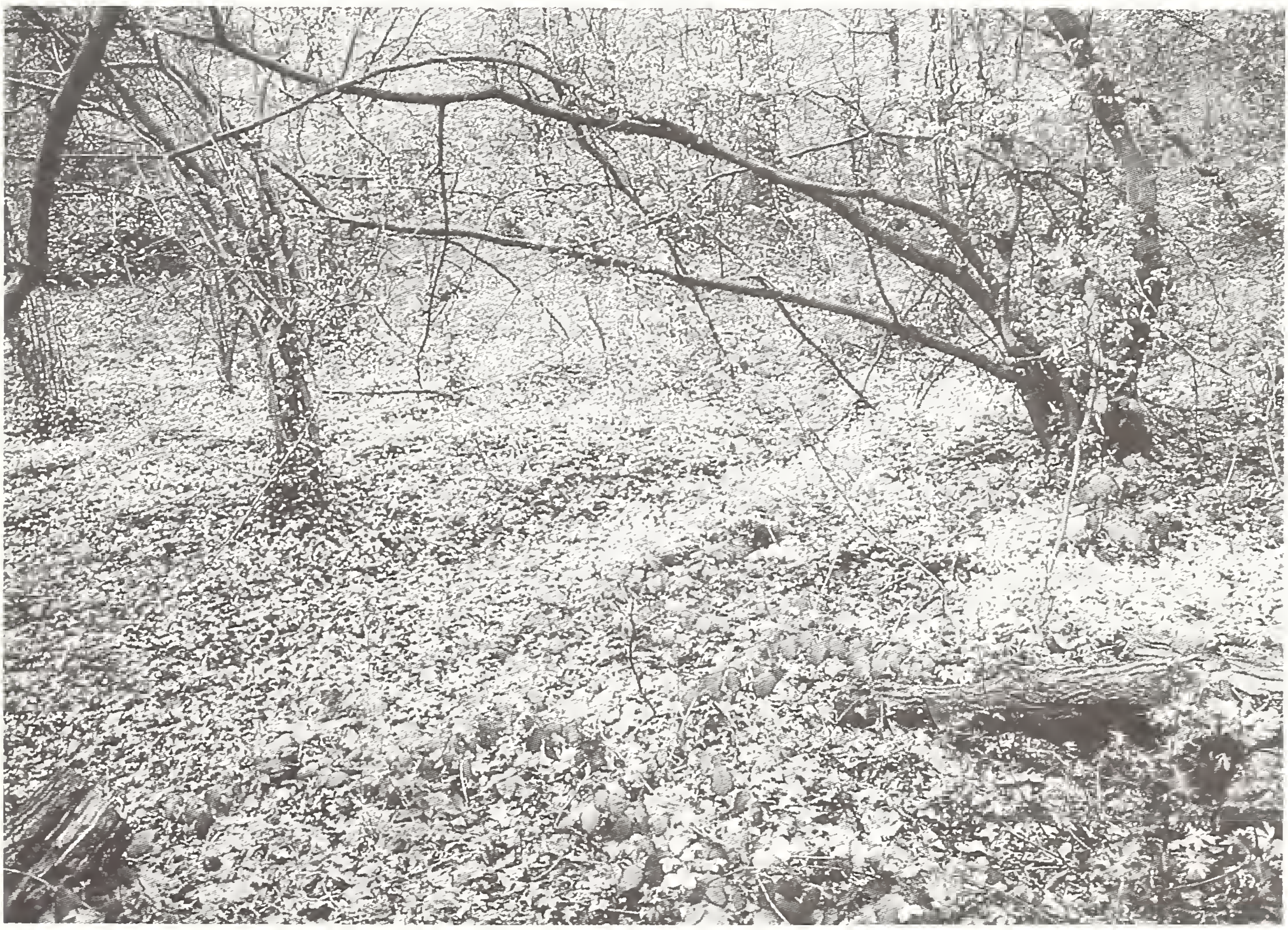

FIG. 3. Queen's Wood, showing wood anemones.

actually benefited the Wood as the thinning of the canopy has allowed light to penetrate to the woodland floor thus creating a number of natural glades. By the northern edge of the Wood, where the damage was particularly severe, two glades have been fenced to allow regeneration to take place free of trampling. The results have been dramatic and the succession from bare ground through rose-bay willow-herb *Chamerion angustifolium* to bramble *Rubus* spp. is similar to that seen in the Highgate Wood enclosures. Slender St John's wort *Hypericum pulchrum* occurs here in what may be its most central London location. Its showier relative, the tutsan *H. androsaemum*, has also been recorded from one or two places in the Wood, but these plants have probably originated from nearby gardens where they are still occasionally grown as ornamentals. This may well explain the presence of isolated plants of gladden *Iris foetidissima*. Perhaps the most exciting botanical find since the Great Storm was the rediscovery in 1990 of the broad-leaved helleborine *Epipactis helleborine*. This was previously recorded from the Wood by E. B. Bangerter in 1956 (Kent 1975). In addition to these notable native species, a wide range of alien plants occurs, reflecting the urban nature of the Wood's surroundings. These include the yellow-flowered strawberry *Duchesnia indica*, Himalayan honeysuckle *Leycesteria formosa* and Indian horse-chestnut *Aesculus indica*. The Wood has also been infiltrated by a hybrid swarm of the Highclere holly *Ilex* × *altaclerensis*, which seems to be under-recorded in London, being absent from either Burton (1983) or Kent (1975). It is also known from Highgate Wood.

The bryophyte flora is more diverse in Queen's Wood than in the others, although impoverished by comparison with more rural woodland. Ken Adams (pers. comm.) has recorded 38 species from this Wood including *Mnium punctatum* which is uncommon in north London. Fungi are also well represented. Thomas (1992), who has made a unique study of their varying populations in Haringey over a number of years, lists a total of 243 species from the Borough as a whole, of which 80 have been recorded from Queen's Wood. One of these was the death cap *Amanita phalloides* which was not recorded elsewhere in the Borough.

Grey squirrels *Sciurus carolinensis* are abundant here as in all the Woods described. They cause considerable damage to the trees, especially hornbeam, by gnawing the bark in the summer months. However, hornbeams are widespread and squirrel damage can sometimes be of benefit by thinning the canopy and allowing light to penetrate. It also results in much dead, standing wood which is attractive to woodpeckers and other birds. More seriously, squirrels can strip hazel of its nuts and prevent regeneration. As a consequence it is rare to find seedlings and Rackham (1986) has suggested that it is now the most seriously threatened British tree excepting elm.

Milner (1990) has studied the spider fauna of Queen's Wood. A total of 76 species was recorded. The striking feature was 'the presence of what are known to arachnologists as weed or ruderal species not normally found in woodland at all'. The number of typical woodland spiders was less than might normally be expected in such a wood and certainly significantly less than those recorded during a similar study at Oxleas Wood (Milner 1988). This doubtless reflects the high levels of human disturbance in the Wood. Milner concluded his paper with some thoughts on the management implications of his findings. He suggested that more enclosures should be established to prevent excessive trampling. If this were to be combined with some coppicing where the canopy is most dense, regeneration of the ground flora would be encouraged. This would have great benefit to invertebrates. Following the very successful application of this approach in Coldfall Wood, I subsequently co-ordinated the coppicing of a small area of Queen's Wood in February 1992. This work was carried out by members of the British Trust for Conservation Volunteers, Friends of Queen's Wood, and the Haringey Branch of the London Wildlife Trust.

Coldfall Wood

I should now like to turn to Coldfall Wood (14 hectares) which is the wood that I have studied most closely (Bevan 1986). It was purchased in 1930 by Hornsey Council and is now owned and managed by Haringey. Its western and northern boundaries are demarcated by the remains of an ancient woodbank (see Frontispiece) with a ditch on the outer side. This would have prevented grazing animals from the surrounding Finchley and Hornsey Commons from entering the Wood and destroying the young coppice. Like those previously described, the Wood is dominated by oak standards, but the understorey is much less diverse and consists of almost pure stands of multi-stemmed, overgrown hornbeam coppice. Beech, hazel, mountain ash and wild service are all rare, though there are some fine specimens of the last species.

Little light penetrates to the woodland floor and large areas of the Wood are devoid of either shrub, field or ground layers of vegetation. Consequently the Wood presents a dark and gloomy appearance in the summer months. Nevertheless in the few natural glade areas caused by the collapse of an occasional canopy tree, the flora is of considerable interest. Pill sedge *Carex pilulifera* hangs on in its only known Haringey site and tiny populations of cow-wheat, slender St John's wort, wood anemone and heath speedwell *Veronica officinalis* manage to survive though they seldom flower. Silvertown (1978) pointed out in his paper that the Wood's future was bleak unless active mangement was undertaken. I am pleased to report that this is now happening and as readers of the Society's *Newsletter* will be aware, some coppice work has already been carried out. An area of approximately one acre was cut in the north-western corner of the Wood in December 1990 with the invaluable assistance of the British Trust for Conservation Volunteers, the Friends of Coldfall Wood and the Haringey Branch of the London Wildlife Trust. The felled hornbeam poles were cut, stacked on site and allowed to decay in situ to provide deadwood habitat for the benefit of invertebrates and fungi. Brushwood was used to construct a dead hedge around the coppice. This has protected the area from trampling, both by dogs and humans, and will hopefully provide a nesting habitat for wrens and other woodland birds. Regrowth from the cut hornbeam stools has been encouraging with a maximum growth of two metres being recorded by the end of 1991.

The vegetational succession following the coppice is being carefully monitored by means of permanent quadrats (Figures 4 and 5). In the first year after coppicing, more than 70 species of flowering plants have been recorded here – a gratifying increase from the original flora of a mere six species. The newcomers include heath groundsel *Senecio sylvaticus* which is unknown elsewhere in the Borough, suggesting the possibility that its seed may have lain dormant in the soil since the last coppice was cut before the Second World War. Ring counts of the coppice poles suggest that this was done about 60 years ago. The majority of new plants, however, will have colonised from outside and many of the arrivals are widespread ruderal species typical of disturbed open habitats, such as mugwort *Artemisia vulgaris*, sow-thistles *Sonchus* spp. and willowherbs *Epilobium* spp. Rose-bay willow-herb dominates much of the area. A hundred years ago this was a rare plant in southern England and it is noteworthy that it was recorded from Coldfall Wood as early as 1901 (Kent 1975). The appearance of Sumatran fleabane *Conyza sumatrensis* was not entirely unexpected, for it has spread rapidly throughout Haringey since first being recorded from the Borough in 1985 (Wurzell 1988). It is also present in North Wood. There can be few other ancient woods in Britain which include this subtropical species in their flora.

Edward Milner has been following the spider sucession by locating pitfall

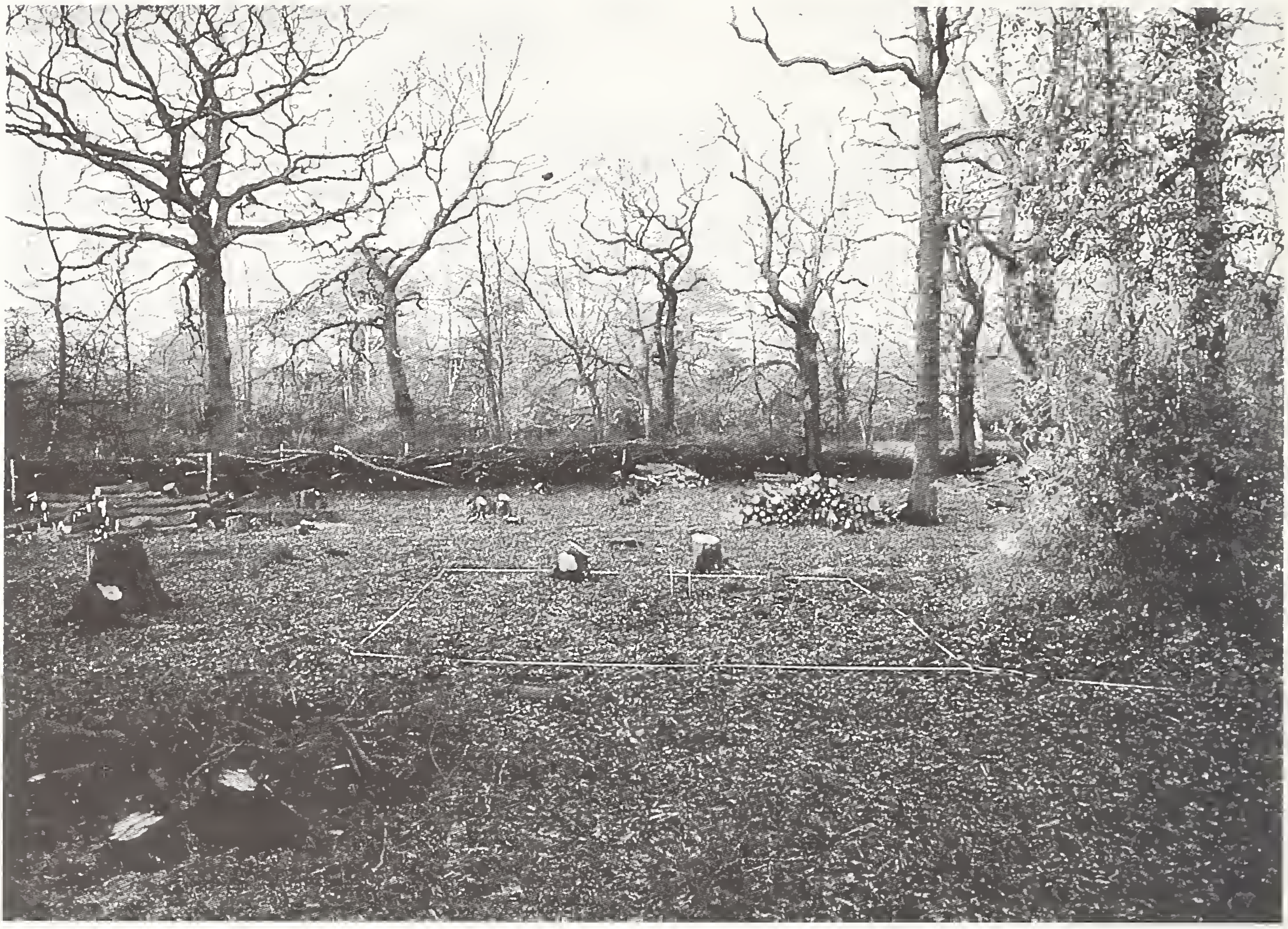

Fig. 4. Coldfall Wood, showing the first coppice, immediately after cutting, in December 1990. A quadrat is present in the foreground.

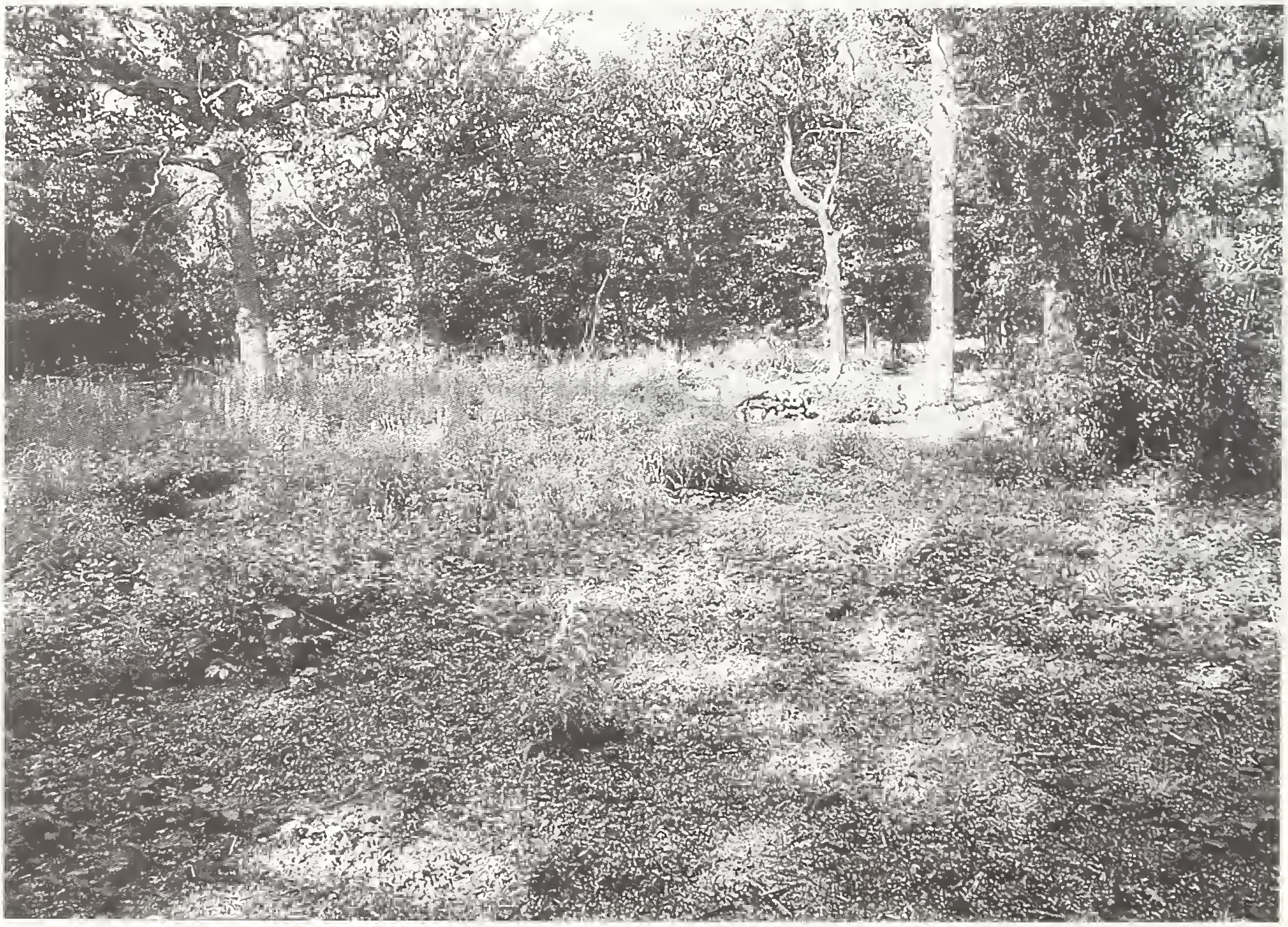

Fig. 5. This shows exactly the same view as Figure 4, taken nine months later!

traps in one of the permanent quadrats. We hope to correlate our findings in due course.

A second area of coppice was cut in the north-eastern corner of the Wood in November 1991. This is a damper site and should support a different range of plants. It is hoped to continue coppicing adjacent parts of the Wood each winter as part of a long-term management plan.

Bluebell Wood

Bluebell Wood is Haringey's most northerly wood (Figure 6). It is owned by the Council and is a triangular fragment of little more than a hectare, surrounded on two sides by Muswell Hill Golf Course and on the third by allotment gardens and a few houses. The name Bluebell Wood is something of a misnomer today as the only bluebells are occasional strays of the Spanish hybrid from nearby gardens. This vigorous cross between our native bluebell *Hyacinthoides non-scripta* and the Spanish species *H. hispanica* is much the most widespread bluebell in Haringey today. The true native species is decidedly uncommon. The Wood is all that now remains of the once extensive Tottenham Wood, which in 1619 covered 157 hectares. It is dominated by sessile oak, but unlike the woods so far described there is little or no understorey and no evidence of past coppicing remains. A fine, suckering wild service tree and scattered midland hawthorn hybrids reflect the Wood's antiquity, which is also demonstrated by the presence of a woodbank and ditch close to the northern boundary. As in Coldfall Wood, a younger fringe of woodland now extends beyond the bank and encroaches onto the golf course. A stream runs along the western boundary and its banks support a small colony of wood millet, an attractive grass often associated with ancient woodland, though it is sometimes planted. I have not seen it elsewhere in Haringey.

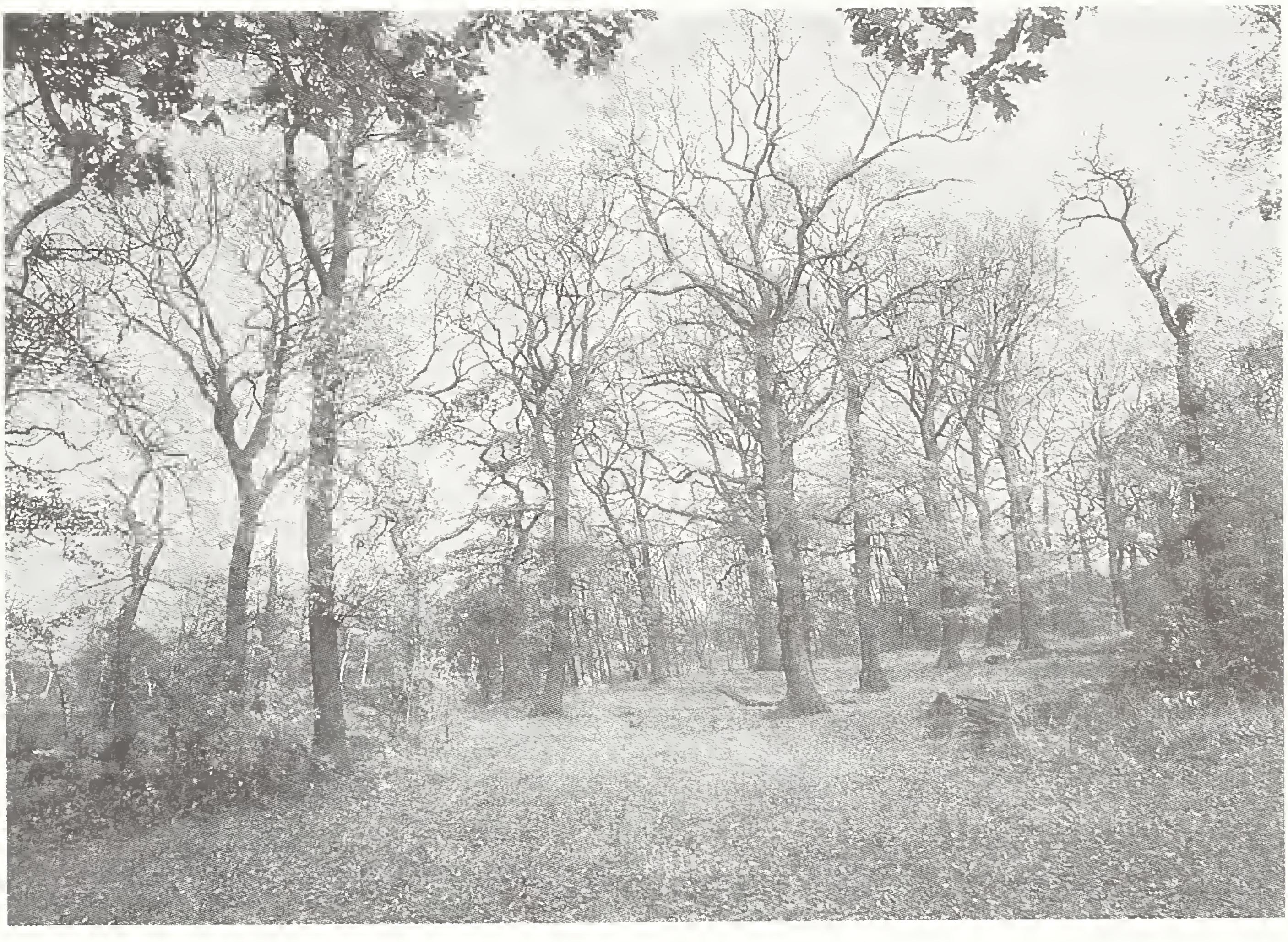

Fig. 6. Bluebell Wood.

North Wood

Finally we come to North Wood (*c.* five hectares) which is very different from the oak/hornbeam woodland so far described. Here the canopy is dominated by beech and sessile oak, with occasional Scots pine, all of which thrive on the free-draining Bagshot Sands. The Wood is part of the Kenwood Estate, now managed by English Heritage, and extends westward into Barnet. It formed the southern extremity of the former Bishop's Wood of Hornsey Great Park which was built over in 1920. It was added to the Kenwood Estate by the Second Earl of Mansfield in 1793. Only the Southern part of the Wood (to the south of Prospect Hill) is ancient (Figure 7), the remainder being unwooded at the time of John Rocque's Survey of London in 1746. The ancient part consists of an over-mature high forest of beech and sessile oak which has never been coppiced. Such stands are nationally uncommon and particularly scarce in Greater London. The old and over-mature trees provide an important dead-wood habitat for a range of invertebrate species including the nationally rare jewel beetle *Agrilus pannonicus* whose larvae develop in and under the bark of oak. This species is listed as vulnerable in the *British red data book* (Shirt 1987). For all these reasons, English Nature has notified the Wood and the adjacent Ken Wood as a Site of Special Scientific Interest. It is Haringey's second such site, the other being the small portion of Walthamstow Reservoirs that lies within the Borough. Plant (1990) surveyed the invertebrate fauna of Ken Wood and North Wood between July and October 1990, as part of an entomological assessment commissioned by English Heritage. Efforts were particularly concentrated on searching for invertebrates associated with dead wood. Although a comprehensive assessment could not be made due to the seasonal restriction of the survey, the presence of *Agrilus pannonicus* was confirmed from Ken Wood together with a number of other rare saproxylic species. Many of these were recorded from Ken Wood only where a greater quantity of long-

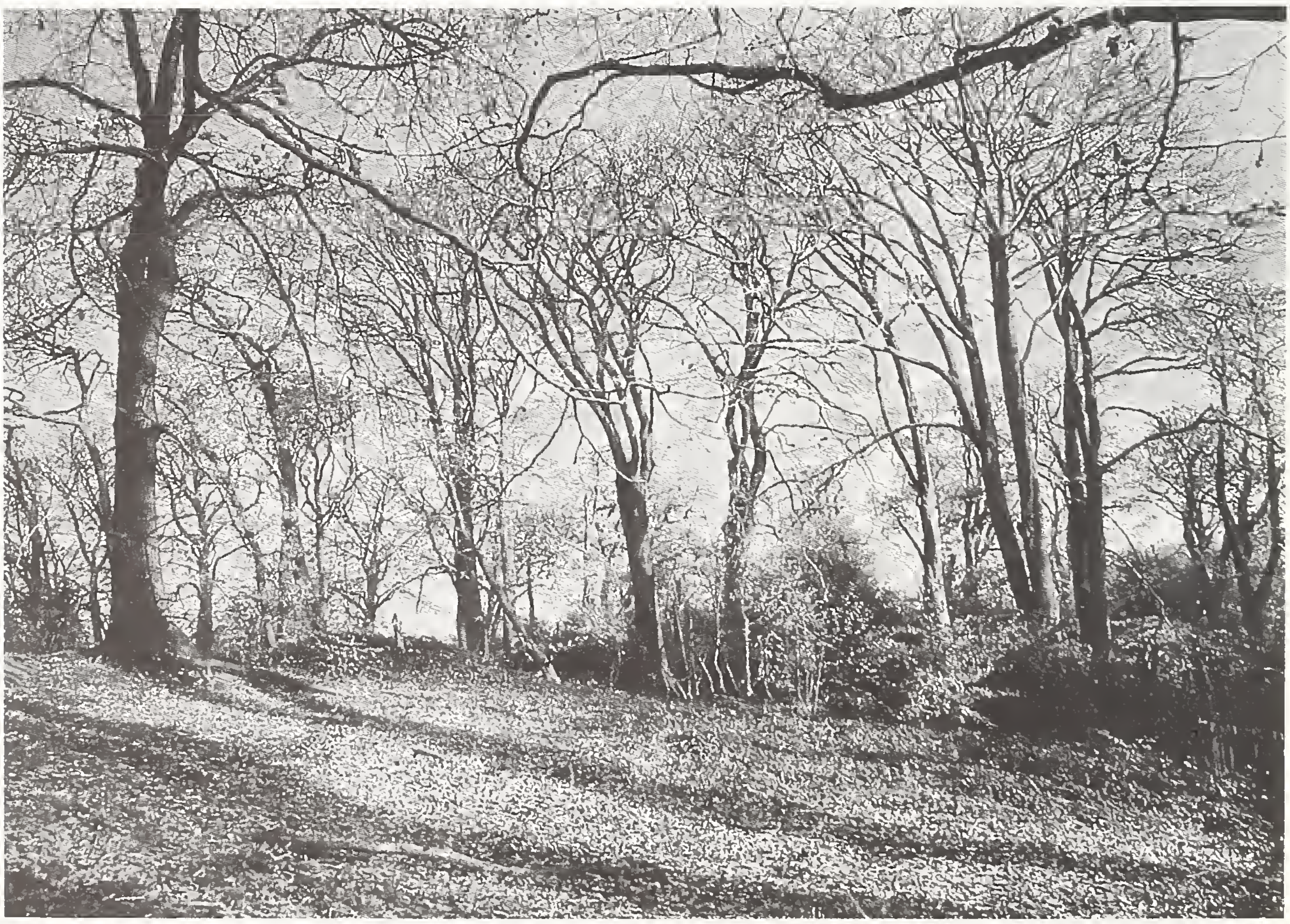

Fig. 7. North Wood, showing Prospect Hill.

standing dead wood was found and which also contains an area of derelict hazel coppice. North Wood, by contrast, appeared to have a more impoverished invertebrate fauna. It has a high proportion of secondary woodland of comparatively recent origin and suffered badly from a vigorous 'spring clean' in the 1970s which resulted in the removal of much dead wood. Nevertheless, some of the apparent imbalance between the two Woods may result from recorder bias and further survey work is needed. An earlier botanical survey, also carried out for English Heritage, coincided with the 1987 storm which brought down more than 100 mature trees in Ken Wood and North Wood. Although this was a tragedy, it presented a unique opportunity to investigate the ages of the trees by counting their annual growth rings. The majority of trees in the southern part of North Wood were found to be over 200 years old and must be among the oldest trees in Haringey. The survey also indicated that there was very little regeneration of these trees within the Wood. In the eighteenth and nineteenth centuries *Rhododendron ponticum* and cherry laurel *Prunus laurocerasus* were extensively planted as game coverts. They cast a dense shade and their leaf litter, which contains phenols and tannins, poisons the soil. This has resulted in the widespread suppression of other species. English Heritage recognises that if North Wood and Ken Wood are to regenerate these shrubs must be removed. Another problem affecting tree regeneration is the presence of a large population of rabbits which eat the young seedlings. They do not appear to eat holly, which may well explain the dominance of this tree in the shrub layer. The presence of muntjac deer *Muntiacus reevesi* has also recently been confirmed from droppings found in the Wood in December 1990 (Clive Herbert, pers. comm.). This deer is now common in much of Hertfordshire and there are breeding populations at Scratch Wood in Barnet and at Trent Park in Enfield (Herbert 1990). The higher levels of disturbance and the more urban character of Haringey make it unlikely that the animal is able to breed here. Occasional records from the Borough are likely to be of dispersing males.

The friable nature of the Bagshot Sands made Ken Wood and North Wood ideal habitats for badgers *Meles meles* in the past and they were regularly recorded here until the Second World War. There have been occasional rumours of badgers in the Ken Wood area in more recent years and in the early 1960s a dead one was reported from East Heath Road flanking the southern edge of the Heath. More remarkably, in 1985, following reports of a sighting, LNHS member Geoffrey Taylor (pers. comm.) was able to confirm the presence of a badger at North Wood by the discovery of its hairs at the entrance to an enlarged fox hole. Their identity was confirmed at the Natural History Museum. A watch was kept, but no further signs were found. Taylor concluded that the badger had moved on 'driven by a strong urge to make contact with others of its kind, having discovered that there were none at Ken Wood'. How it arrived there must be a matter for conjecture, but there have been one or two confirmed sightings nearby at Alexandra Palace during the last decade. Sadly, these occasional wandering animals are unlikely to re-establish a badger colony at Ken Wood.

This concludes my brief account of these ancient woods which I hope may stimulate further work on their fascinating natural history.

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Book Review

A Natural History of the Lakes, Tarns and Streams of the English Lake District. By Geoffrey Fryer. Freshwater Biological Association, Ambleside. 1991. 368 pp., many black and white illustrations. £18 post free from the FBA, The Ferry House, Far Sawrey, Ambleside, Cumbria LA22 0LP. ISBN 0-900386-50-9.

When I first saw this volume, I was attracted by its unusual appearance. The text is in a very clear and readable manuscript – calligraphy by Sharon Murphy – and the book is in landscape form, that is, the pages are wider than deep (9½″ × 7¼″/26 cm × 18 cm). The limp cover bears an attractive line drawing of a lakeland scene and about 800 line drawings embellish the text. The publisher's note makes it clear that the book was designed to attract students, amateur naturalists and those wanting a non-technical account of British freshwater natural history.

Whilst the opening chapters give a readable and valuable account of the geology of the Lake District and the development of the area since the last ice-age, the bulk of the book is devoted to the plants and animals to be found in and around its lakes and other waters. These chapters, dealing as they do with such groups, little known to many of us, as freshwater algae, Protozoa, rotifers, worms and Crustacea, as well as insects and other invertebrates, all splendidly illustrated by the author's line drawings, will form a valuable source of reference for students of freshwater life anywhere in the country.

I commend this book, but have to say that I found scanning lines of text over 8 inches in length very tiring (it was impossible to read it in bed!) and wish that the FBA had not departed from the normal 'book-shape' and a standard type-face.

P. C. HOLLAND

Gilbert White and his London Connections

By June E. Chatfield*

Summary

Gilbert White the Selborne naturalist regularly stayed with his brothers in London and through these visits met other naturalists connected with Benjamin White's Fleet Street book business. He attended meetings of The Royal Society and corresponded with Thomas Pennant and Daines Barrington to whom the letters making up his book *The Natural History of Selborne* were addressed. He also observed the wildlife of town and the more rural area (now fully urban) of South Lambeth where his brothers lived from 1778, recording these in his *Naturalist's Journal*. The London visits had a positive influence on Gilbert White's scientific work.

Introduction

The year 1993 marks the bicentenary of Gilbert White's death. He was born in Selborne in July 1720 at the Vicarage and died at 'The Wakes' in June 1793 in his seventy-third year. At the time of his birth his grandfather, The Reverend Gilbert White senior, was vicar and in whose steps his grandson, Gilbert White the naturalist, was to follow into the Church, but the latter was only able to serve as a curate at Selborne since he was not a graduate of Magdalen College which held the living. Although he had several short periods as curate it was only in the last nine years of his life that he worked for a long period as curate in Selborne, however he lived for most of his life at 'The Wakes', travelling to do his duties as curate at the neighbouring village of Farringdon for over 20 years. Further biographical details on Gilbert White are found in the introductions to some of the editions of his book *The Natural History of Selborne* and also in biographical books (Holt-White 1901, Mabey 1986, Foster 1988) about Gilbert White. Through his book, published in 1789, Gilbert White not only achieved a classic of science as a pioneer ecologist, behaviourist and countryside writer, but he made the obscure and then isolated village of Selborne famous throughout the world as editions of his book continued to be published over the next two centuries. Today his former home 'The Wakes' is preserved as a museum receiving visitors and Gilbert White devotees from around the world. His book has introduced many people to the study and enjoyment of natural history and has stood the test of time.

Whilst the core of *The Natural History of Selborne* concerns the countryside, animals and plants of White's native Hampshire parish of Selborne, he travelled considerably around southern Britain, visiting relatives and friends and maintaining his contact with Oriel College in Oxford. Seeing other places and meeting people, including some of the leading scientists of his day, he was later able to apply the breadth of this experience to his case-study of Selborne. Travels outside Selborne are occasionally referred to in his book, but a more complete coverage of them is obtained by a study of his journals from 1751 (*The Garden Kalendar* and from 1768 *The Naturalist's Journal*) and from private letters, some of which have been published in Bell's edition of *The Natural History and Antiquities of Selborne* (1877) and Holt-White's biography (1901). It is appropriate in *The London Naturalist* as we approach the bicentenary of the death of Gilbert White to consider his connections with London and the influence this had on his scientific work.

Visiting Brothers in London

Gilbert White's long connection with London came through visiting two of his brothers whose working lives were based there. Brother Thomas, four years his junior, did not follow brother Gilbert to the University at Oxford but went into

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trade where he joined William Yalden, the brother of a neighbour The Reverend Richard Yalden from Newton Valence just on the other side of the Hanger from Selborne. They were wholesale ironmongers in Thames Street. Although in trade, Thomas was something of a polymath, interested in natural history, gardening, antiquarian studies and literature, and he also ventured into scientific circles. Thomas later married the widow of his business partner and had three children, the eldest of whom, Molly, was a most accomplished girl and favourite niece of Gilbert White. She was to be much involved in the transcribing and publication of *The Natural History of Selborne.*

Brother Benjamin, born in 1725, a year after Thomas, went to London to join William Whiston, a relative by marriage, in a publishing, printing and bookselling business, Whiston and White, at the 'Horace's Head', 51 Fleet Street. They became leading publishers of natural history books, producing several titles by Thomas Pennant, and of course in 1789, Gilbert White's own book *The Natural History and Antiquities of Selborne.* Two of his sons, Benjamin junior and John, followed their father into the book business. By the time of the publication of *Selborne* Benjamin senior had retired to Bentley in Hampshire, so most of the work on the book was undertaken by his son Benjamin and niece/daughter-in-law Molly who had married her publisher cousin.

Through Benjamin's book business Gilbert White, on his visits to London, met a number of naturalists including Daines Barrington and Thomas Pennant to whom the letters making up his book were addressed. They led him to more prestigious circles, the meetings of The Royal Society and The Society of Antiquaries.

Gilbert White made regular visits to stay with his brothers Thomas and Benjamin in London and in later years the two were near neighbours having moved out of London itself to South Lambeth across the Thames into Surrey, then a suburban village. White's personal letters and entries in *The Naturalist's Journal* record the dates of these visits and there are entries on goods purchased from London through his brothers, like books from Benjamin (recorded in his account books), salt-fish, tea and wine from Thomas.

Before he started *The Naturalist's Journal* in 1768 there is no systematic record of Gilbert White's travels. From 1768 in the journal entries we find that he went to London at least once a year, sometimes twice, and staying there for periods of one to seven weeks. Early spring – February and March – was the most usual time for the visit, but he went to London in January, April, May, June, July and November, but in his later years opted for summer visits. He omitted to visit in 1771 and 1775 and his last journey to London was made in June 1791, two years before his death (see Appendix). Some *Journal* entries were made during these visits which cover natural history observations, the seasonal availability of food items, the weather, astronomical phenomena, items of news, social visits and details of the journey. On some occasions he appeared to be too busy to make journal entries whilst in London.

Full transcriptions of White's *Garden Kalendar* and *The Naturalist's Journal* have been published in a three-volume edition edited by Francesca Greenoak and Richard Mabey (White 1986, 1988 and 1989) and these include entries made during his London visits. Selected quotations from the *Journal* have been available for 60 years (Johnson 1931, reprinted twice). In the earlier visits Gilbert White would probably have been staying in Fleet Street or Thames Street, but from 1778 he records his base as South Lambeth on the Surrey side of the Thames, where both brothers Benjamin and Thomas White had moved to and which was then more rural.

The comparatively rural situation of South Lambeth in the late eighteenth century is indicated by their reference to a house cow, butter-making, hay-making, hayricks, lucerne and oat crops. Both brothers had well-stocked vegetable gardens which are frequently referred to and one reference records the nieces making raspberry jam (8 July 1791). Brother Thomas was also interested in natural history and in 1782 he put up scallop shells on his eaves for house martin nesting sites.

> On 5 June 1782 'My Bro:^{r}. Thomas White nailed-up several large scallop-shells under the eaves of his house at South Lambeth to see if the house martins would build in them. These conveniences had not been fixed half an hour, before several pairs settled upon them; &, expressing great complacency, began to build immediately. The shells were nailed on horizontally, with the hollow side upward; & should, I think, have had a hole drilled in their bottoms to let-off moisture from driving rains.' (*The Naturalist's Journal*)

The journeys to and from London afforded points of interest for entries in the journals. Those early in the year must have been intrepid with snow around in February while in the summer they were virtually baked in the post-chaise with the sun streaming in and there are references to the roads being dusty in dry weather. Interestingly the route taken on these journeys from Hampshire to London and back is also outlined. White would travel four miles to Alton to pick up the London coach and sometimes stayed overnight at the Swan Hotel in Alton. The coach then went via Farnham and Guildown (the route of the modern A31 across the Hog's Back) and then via Guildford and Cobham (the modern A3) to Kingston, Clapham and Wandsworth. On one occasion they went via Epsom.

Visiting John Mulso in Sunbury

In 1749 Gilbert White's Oriel College friend and contemporary, The Reverend John Mulso, took his first living at Sunbury in Middlesex where he stayed until 1759. Records of his visits to Sunbury come from the published transcriptions of John Mulso's letters to White published earlier this century (Holt-White *c.* 1906) and references in *The Garden Kalendar* to his periodic absence. He went in 1749, 1753, 1754 and 1756 when he stayed for a month, but there are relatively few notes on these visits, since they pre-date the more intensive journal-keeping from 1768.

Reference is made in Letter 12 to Pennant in *The Natural History of Selborne* to these visits to Sunbury

> 'About ten years ago I used to spend some weeks yearly at *Sunbury*, which is one of those pleasant villages lying on the *Thames*, near *Hampton-court*. In the autumn, I could not help being much amused with those myriads of the swallow kind which assemble in those parts. But what struck me most was, that from the time they began to congregate, forsaking the chimneys and houses, they roosted every night in the osier-beds of the aits of that river.'

Contact with Pennant and Barrington

One of the main attractions of the London visits was the meeting of people and it was here that White encountered many of the leading scientists of his day and at the time when he was working on his book. In August 1767 he started to correspond with Thomas Pennant of North Wales whose *British Zoology* was being re-issued in a fourth edition by Benjamin White. Gilbert White helped with proof reading as well as providing additional material (like the discovery of the harvest mouse). The dated letters in this correspondence form the first part of *The Natural History of Selborne* and from the reference in letter 10 to Pennant dated 4 August 1767 we conclude that they met through the Fleet Street book business of Benjamin White, but there is no evidence of any subsequent meeting in person between Thomas Pennant and Gilbert White taking place.

Letter 10 to Pennant

> 'I have had no opportunity yet of procuring any of those mice which I mentioned to you in town ...
>
> 'As to the *falco* [falcon], which I mentioned in town, I shall take the liberty to send it down to you into *Wales* ...' (*The Natural History of Selborne*)

The correspondence however, as evidenced by dated letters in *Selborne*, lasted until November 1780. Some of the original letters of White to Pennant are preserved in the British Library, but sadly the other side of the correspondence (Pennant's letters to White) is not known to exist and there is a suggestion in a letter from Pennant to White that they may have been destroyed (*Selborne Mag.* **29:** 74-75).

White much valued his new contacts, for pleasant as Selborne was, it did not provide all his requirements and he was intellectually and socially isolated in this rural parish when his brothers and sisters who shared his interests had left home. This he explains in the tenth letter to Pennant dated 4 August 1767

> 'It has been my misfortune never to have had neighbours whose studies have led them towards the pursuit of natural knowledge; so that, for want of a companion to quicken my industry and sharpen my attention, I have made but slender progress in a kind of information to which I have been attached from my childhood.' (*The Natural History of Selborne*)

The Hon. Daines Barrington was a contact via Benjamin White's business and also a friend of Pennant – they both had Welsh connections (Chatfield 1989) and were Fellows of The Royal Society. Barrington's design for *The Naturalist's Journal* (a layout for natural history notes), was published by Benjamin White and adopted by Gilbert White from 1768 for his own journal notes. Here there is evidence of a deeper friendship and that White and Barrington met several times when their visits to London coincided and he was brought into discussion of White's book very early on in its development as is shown in the fifth letter to Daines Barrington dated 12 April 1770

> 'When we meet, I shall be glad to have some conversation with you concerning the proposal you make of my drawing up an account of the animals in this neighbourhood ...' (*The Natural History of Selborne*)

As well as Barrington's positive encouragement to write up his natural history observations, he also provided White with his best contact with The Royal Society which will be developed in a separate section. The correspondence with Barrington, lasting over a 14-year period until 10 October 1781, provided much of the text for the second part of *The Natural History of Selborne.* London therefore was an important meeting place of people and provided the two contacts that led White to write his book.

In Letter 18 to Pennant Gilbert White describes the sending of live specimens to London

> 'This morning, in a basket, I packed a little earthen pot full of wet moss, and in it some sticklebacks, male and female ... some lamperns; some bull-heads; but I could procure no minnows. This basket will be in *Fleet-street* by eight this evening; so I hope *Mazel* will have them fresh and fair to-morrow morning.'

One presumes that these were specimens for Pennant's artist.

The Royal Society

The Royal Society, founded in 1660 by Charles II, was a focal meeting place in London for scientists in the eighteenth century and it covered a broad spectrum of subject matter – natural sciences, physics, chemistry, astronomy, meteorology and medicine. There was a regular programme of fortnightly meetings in London with papers published in the *Philosophical Transactions of The Royal Society of London.* The membership included many amateurs who were wealthy landowners as well as scientists and the subscription at five guineas (1776), with also an entrance fee, was high. Both scientists and non-scientists were represented on the Council (Lyons 1944). The plethora of local and national natural history societies that was a feature of the nineteenth century had yet to come, and even the Linnean Society of London was not founded until 1788, rather too late in his life to involve Gilbert White. White's correspondents Thomas Pennant and Daines Barrington had the right financial and social background to become Fellows of The Royal Society and their applications were both accepted in 1767. The number of Fellows of The Royal Society was 352 in 1761, increasing to 479 in 1781 (*Record of The Royal Society of London*, 1940). Fellows were able to invite non-Fellows as guests at meetings and these visitors were duly entered in the minute book along with the introducing Fellow. From these records, currently in the archives of The Royal Society's Library at 6 Carlton House Terrace, the presence of some Fellows and all guests at meetings is documented. Gilbert White attended meetings of The Royal Society when he was staying with his brothers in London. From the minute books it appears that his brother Thomas White was also attending fairly regularly as a guest from the early 1770s and from 1777 in his full right as an FRS. Although Gilbert White is often referred to in the minute books as 'The Rev Mr White' – as for his introduction by Daines Barrington on 27 February 1772 – it is not always clear from the minute books which of the White brothers is attending as guests when no initial is given. The situation is further compounded by brothers John and Henry White, also holding the title of Reverend, and attending from time to time. Where more than one of the White brothers is attending the same meeting the minute book then uses Christian names to identify them. Another indication of Gilbert White's visits is to check the dates against his recorded stays in London from *The Naturalist's Journal* (see Appendix). From this we have acceptable evidence of Gilbert White being at meetings of The Royal Society on 27 February 1772 (introduced by Mr Barrington), possibly 17 and 24 March 1774; 7 March 1776 (introduced by Dr Forster); 27 February 1777 (introduced by Sir John Cullum); 1778 (introduced by brother Thomas White who had been made a Fellow the previous year) and 18 March 1784 (introduced by Dr Lort). From 1710-78 meetings were held at Crane Court in Fleet Street and after that at Somerset House where the Society had premises available from the Government (*Record of The Royal Society of London*, 1940).

The Hon. Daines Barrington was a very useful contact for Gilbert White since he was Vice-President of The Royal Society from 1771-4 and introduced him at his first meeting. *The Natural History of Selborne* Letter 30 to Thomas Pennant (1 August 1770) gives an account of White being taken behind the scenes to see The Royal Society's collections in 1770. These collections were transferred to the British Museum in 1781.

Barrington's part in introducing Gilbert White to The Royal Society is also recorded in two letters from Gilbert White to his brother John White published in volume 2 of Bell's edition (1877) of *The Natural History and Antiquities of Selborne*

> 'My letters to Mr Barrington swell very fast. He has engaged me in the monography of the swallow genus. I have dispatched the *house martin*; and my letter is to be read before the R.S. [Royal Society]. I wish I knew a little more about the *bank martin* [sand martin]. Does Mr Lever know anything about the bank martin that can be depended on.' (Gilbert White to John White, 9 December 1773)

The following postscript to another letter to brother John (6 March, year not given) outlines his knowledge of the movements of Linnaeus and mentions his visit behind the scenes at The Royal Society in the company of John's son Jack who was staying at Selborne

> 'If you have anything for Linn. [Linnaeus] send it up soon, because the ship is likely to sail shortly.'
>
> 'Mr B. [Barrington] shewed me and Jack the curiosities of the R.S. [Royal Society]; there was a stuffer packing and preparing the productions of N. America for the use of the King of Spain.'

Barrington, then during his term as Vice-President, also arranged for Gilbert White's monographs on the swallow, martins and swift to be read to The Royal Society and subsequently published in the *Philosophical Transactions* in 1774-5 and these letters were later re-published in White's *Natural History of Selborne* in the Barrington series of letters. Curiously enough Gilbert White was not present when they were read, for entries in his *Naturalist's Journal* for 10 February 1774 show he was in Selborne and 9 and 16 March 1775 show that he was staying with brother Henry at Fyfield in Hampshire at the time, some 70 miles out of London. In his biography Rashleigh Holt-White (1901), a relative of Gilbert White, refers to 'a family tradition of his shyness on being introduced at their [Royal Society] receptions'. Gilbert White was not completely satisfied with the way The Royal Society had printed his text, outlining the typographical errors in a letter to his nephew Samuel Barker dated 15 November 1775 (Holt-White 1901). It is interesting to note that also present at some of these meetings with Gilbert White were Joseph Banks, Daniel Solander, Sir Joseph Pringle and the surgeon John Hunter, while other famous names turned up at meetings he did not attend. It is unfortunate that the records of Fellows at meetings is incomplete.

In Letter 24 to Pennant in *The Natural History of Selborne* dated 29 May 1769 there is a reference which indicates either a meeting or correspondence between White and Banks as he refers to 'Mr Banks told me ...'.

Having had his swallow, martin and swift letters published by The Royal Society (White 1774, 1775), Gilbert White started to prepare a similar monograph on nightjars which he was well situated to study since they then occurred on the Hanger at Selborne and their churring could be heard from his garden at 'The Wakes'. He was writing this up in the last few years of his life when he seems to have lost contact with The Royal Society, although his brother Thomas was a Fellow and other members of his family were still attending as visitors. The outcome of the nightjar monograph was that White died with it unfinished and the story of this comes out in his correspondence with Robert Marsham, published in the Bell edition of *The Natural History of Selborne* (1877). Barrington, to whom he again applied to put his work forward, had replied to say that he could not help since he had had some disagreement with The Royal Society.

During the time when Gilbert White attended meetings of The Royal Society (1772-84) and afterwards when he would have received reports from brothers attending meetings, he was kept in contact with the mainstream of scientific discovery.

Another regular visitor to The Royal Society meetings and an annual contributor to the *Philosophical Transactions* was Gilbert White's brother-in-law Thomas Barker of Lyndon Hall in Rutland (Kington 1988). The leading amateur meteorologist in this country at the time, he kept weather records in Rutland and also organised the collection of comparative data from Selborne and Fyfield in Hampshire and South Lambeth near London from his White brothers-in-law, Gilbert supplying the weather records and instrument readings for Selborne.

With a growing interest in antiquarian studies from the enlargement of his book to encompass 'The Antiquities of Selborne', Gilbert White also attended meetings of The Society of Antiquaries of London, and his niece Molly White records in a letter to her brother dated 22 March 1784 (year researched by Sheila Rainey)

> 'My uncle went to the Antiquaries and Royal Societies last Thursday with Dr Lort. Mr Baker's account of his work was read ...'

Again in a letter to The Revd Churton dated 30 March 1784 (Holt-White 1901) there is also a reference to these societies

> 'As I propose to return to Selborne on Friday next, and to set out for Oxford on Easter Tuesday, it does not seem very probable that we shall meet. If you are in London on a Thursday, I would advise you by all means to attend on The Royal Society and Antiquary meetings in their new splendid rooms at Somerset-house. Dr Chandler can probably put you in a method of being introduced; if you do not

> see him, attend in the outer room, between the two rooms at a *quarter* before *seven* in the evening and enquire for Dr Lort, who, I trust, on your using my name will introduce you to both the meetings where perhaps you may hear something worth your trouble. The Antiq. Society, I find, is growing very fashionable; for I observed that many Right Honourables were balloted for on a Thursday se'nnight.'

Daines Barrington was also a Fellow of The Society of Antiquaries.

The Naturalist's Journal

Whilst he was away in London there is record (*Naturalist's Journal* 4 February 1780, 24 June 1780, 29 March 1783, 25 February 1784) that his manservant at Selborne, Thomas Hoare, continued with the weather records in his absence. On some occasions (February 1772) White made no notes in his *Naturalist's Journal* during the London visit, other years there were limited entries for London but records became more abundant and fuller after the brothers had moved to South Lambeth, where presumably there was more of natural history interest to record. From 1784 the notes from South Lambeth more resembled the style of the *Journal* when kept in Selborne.

The early entries for 1768 in Fleet Street feature the seasonal supply of food in the shops, some items of which would not have been so readily obtainable in Selborne. Indeed from time to time Gilbert White ordered groceries (including salt-fish) to be sent from London to Selborne and these are often recorded in his correspondence with his niece Molly White (brother Thomas's daughter). There was a strong seasonality to supplies. Fish for sale included Dutch plaice, turbots, smelts, herrings, mackerel, hallibut, sturgeon, prawns and crayfish, and the herrings were described as 'the usual forerunners of mackerels'. Lapwing eggs were for sale at a poulterers, young rabbits, and there is record of 'green geese are driven along the streets in great droves …' presumably to market (9 May 1769).

Weather features prominently in records of London, particularly the snow that was often encountered on the early spring visits

> 23 January 1776 'The ground covered with snow, & everything frozen-up.'
> 1 February 1776 'Snow now lying on the roofs for 26 days! Thames frozen above & below bridge; crowds of people running about on the ice. The streets strangely encumbered with snow … Carriages run without any noise of clatter …'

Snow was on the ground during his visit to London in February 1782, a year in which he refers to the roads being very dusty on his return journey, and again he encounters snow *en route* to South Lambeth and on the return journey

> 2 April 1784 'No snow, 'til we came to Guild-down: deep snow on that ridge! Much snow at Selborne in the fields: the hill deep in snow! a few days ago our lanes would scarce have been passable for a chaise.'

Conditions for the homeward journey in July 1789 when Gilbert White and his sister-in-law (John's widow) were travelling in summer were noted for the heat

> 3 July 1789 'The western sun almost roasted us between Guildford & Farnham, shining directly into our chaise.'

Most of the natural history entries in *The Naturalist's Journal* concern South Lambeth, then a comparatively rural location with more scope for birds than central London. It is within the area of study of the London Natural History Society. Swallows, house martins and swifts were present nesting in buildings and in February 1779 he saw sparrows building nests in South Lambeth. For 'London' on 6 March 1780 he writes 'Sky-larks mount, & sing'. This is a bird which was once widespread on any open ground but has been steadily pushed out with the development of London and its suburbs removing the rough open grassy ground it needs to live.

The following were recorded in *The Naturalist's Journal*

> 1 May 1785 'Saw one Swift. Two house-martins in Fleetstreet.'

> 4 July 1786 'A cloud of Swifts over Clapham …'
>
> 7 July 1786 'Many swifts near Kingston.'
>
> 5 July 1791 'Many Martins in the green park.'
>
> 6 July 1791 'Many martins in Lincolns inn fields.'

In London Gilbert White refers to the lack of suitable nesting materials

> 27 May 1787 'In outlets about town, where mosses, lichens, gossamer &c, are wanting, birds do not make nests so peculiar each to it's species.'
>
> 15 June 1787 'Many swifts at Wansworth [*sic*], Kingston, Cobham &c.'

Flies were a domestic problem

> 31 March 1778 'Flies abound in the pastry-cooks shops.'
>
> 19 June 1788 'Muscae domesticae [houseflies] swarm in every room.'

At South Lambeth, where brother Benjamin had several acres of hay meadow and where they kept a cow, a greater range of wildlife is noted. There is a reference to elms, once a prominent feature of London's countryside and also to wild roses and sweet briar.

On 23 May 1787 Gilbert White records a pair of red-backed shrikes ('red-backed butcher birds') nesting in his brother Thomas's outlet and this bird was seen again the following year on 6 June 1788, this time in brother Benjamin's outlet. This summer visitor to south-east England is now very much rarer than in Gilbert White's time. Also seen and heard at South Lambeth were chaffinches, hedge-sparrows, cuckoos, martins, swifts, swallows and redstart

> 20th May 1787 'The red-start sits, & sings on the fane in Bro: Ben's garden, upon the top of an high elm.'

Chafers (beetles) are recorded in South Lambeth in June 1786, 1788, 1790 and 1791

> 26 June 1786 'Bro:^{r} Ben's outlet swarms with the Scarabaeus solstitialis, which appears at Midsum^r.'
>
> 8 June 1788 'The *scarabaei solstitiale* begin to swarm in my Brother's outlet …'
>
> 15 June 1788 'The solstitial chafers swarm by thousands in my Brother's grounds. They begin to flie about sun-set, but withdraw soon after nine, & probably settle on the trees, to feed & to engender.'
>
> 29 June 1790 '*Scarabaeus solstitialis:* solstitial chafers begin to fly in my Brother's outlet.'
>
> 27 June 1791 '*Scarabaeus solstitialis* first appears in my brother's outlet: they were very punctual in their coming-out every year. They are a small species, about half the size of the May-chafer, & are known in some parts by the name of fern-chafer.'

This chafer, the summer chafer *Amphimallon solstitialis* is one of several species of beetles which feed on roots including turf during their larval stages and the adults appear in seasonal swarms, often around free-standing deciduous trees on whose leaves the adult chafer feeds (Imms 1947, Lyneborg 1977).

Gilbert White also noted the bats at South Lambeth ,

> 14 July 1791 'A bat of the largest sort comes forth every evening, & flits about in the front of my brother's house. This is a very rare species, & seldom seen. See my history of Selburne.'

This is the noctule bat which Gilbert White discovered and which features in Letters 26 and 36 to Thomas Pennant in *The Natural History of Selborne.* More recent information on bats in London (Mickleburgh 1987) shows the continued presence of this species and refers to a historical record from Wandsworth in 1899. The exclusive tree-dwelling habit of this bat makes the roosts difficult to find, but at feeding sites Mickleburgh recorded the *Nyctalus* bats (noctule and the rare Leisler's) as the second commonest after the pipistrelle.

In other localities south of the Thames, White records green woodpeckers and owls at Vauxhall, house martins at Stockwell and frogs at Battersea. The more rural nature of this now completely urban area is apparent from frequent reference to farm crops

> 5 March 1778 'Wheat looks miserably in Battersea-field.'
>
> 14 June 1786 'Bro Tho has made his hay & his fields are much burnt up.' South Lambeth.
>
> 2 June 1787 'Hay is making at Vaux-hall.'

Conclusions

Gilbert White's book *The Natural History and Antiquities of Selborne* is recognised as a classic of both science and English writing. He presents a detailed case study of one parish in Hampshire over a stretch of time that is based on original observation. Although White introduced the reader to many of the plant and animal species found there, including his discoveries of the harvest mouse, noctule bat and separation of the leaf warblers into what we now know as the chiffchaff, willow warbler and wood warbler, he showed a greater interest in how animals function and behave and relate to their environment. His 'oeconomy' of nature is a forerunner of the modern study of ecology and he also broke new ground in looking at behaviour. His book thus has much to interest those from outside the Selborne area as it covers basic principles and over two centuries has introduced many people to the study of natural history.

Although the observations and inspiration for the book came from Selborne, an exceptionally diverse and rich parish for natural history, Gilbert White had the wider perspective from his London contacts with which to assess the significance of this and through his publisher brother he was well in touch with other books being issued. Selborne parish provided the richness of scope for his first-hand studies, but it had its shortfalls in that White was intellectually isolated from other educated minds. London visits provided the opportunity to meet people and talk science, hear news of progress in the subject, and also the initial contact with the two correspondents, Thomas Pennant and Daines Barrington, who were strongly influential in bringing about the writing of White's book. White was clearly delighted to correspond with Pennant and help him revise his *British Zoology*, while the presentation of *The Naturalist's Journal*, designed by Barrington as a format for natural history notes, provided both a discipline and stimulus to encourage regular note-taking. White himself acknowledged suffering from procrastination, particularly in his later years, as outlined in the Marsham correspondence (White 1877). London visits were therefore an important stimulus and without them there may not have been a *Natural History of Selborne*.

Acknowledgements

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APPENDIX

Gilbert White's Visits to London Recorded in *The Naturalist's Journal*

A list of Gilbert White's visits to London from 1768 with additional travels within the visit, the duration of the visit and recorded attendance at The Royal Society. These dates can be used as a quick reference to White's *Journal* notes on London.

1.ii.1768 London	11.ii.1768 to Oxford—10 days.
3.v.1768 London	14.v.1768 to Selborne—11 days.
25.iv.1769 London	13.v.1769 to Selborne—19 days.
11.vi.1770 London	26.vi.1770 to Selborne–13 days.
24.ii.1772 London	13.iii.1772 to Newton*—20 days. Royal Society 27.ii.1772.
26.iv.1773 London	21.v.1773 to Selborne—26 days.
8.iii.1774 London	25.iii.1774 to Selborne—18 days. ?Royal Society 17.iii.1774 and 24.iii.1774.
22.xi.1774 London	10.xii.1774 to Selborne—20 days.
22.i.1776 Farnham	23.i.1776 London; 22.iii.1776 to Selborne—60 days. Royal Society 7.iii.1776.
18.ii.1777 London	10.iv.1777 Guildford; Selborne 11.iv.1777—53 days. Royal Society 27.ii.1777.
2.iii.1778 Farnham	3.iii.1778 South Lambeth; 12.iii.1778 London; 13.iii.1778 South Lambeth; 26.iii.1778 London; 27.iii.1778 South Lambeth; 2.iv.1778 London; 4.iv.1778 to Selborne—34 days. Royal Society 12.iii.1778 and 26.iii.1778.
23.ii.1779 South Lambeth	20.iii.1779 Selborne—26 days.
29.ii.1780 South Lambeth	2.iii.1780 London; 3.iii.1780 South Lambeth; 6.iii.1780 London; 11.iii.1780 South Lambeth; 12.iii.1780 Ringmer Sussex (for funeral of his aunt Mrs Snooke); 17.iii.1780 Dorking; 18.iii.1780 Selborne—12 days in London, 19 days away.
19.vi.1780 South Lambeth	29.vi.1780 Selborne—11 days.
27.ii.1781 Alton	28.ii.1781 South Lambeth; 19.iii.1781 London; 21.iii.1781 South Lambeth; 29.iii.1781 Alton; 30.iii.1781 Selborne—32 days.

18.ii.1782 Alton	19.ii.1782 South Lambeth; 3.iii.1782 London; 9.iii.1782 South Lambeth; 15.iii.1782 Selborne—26 days.
10.iii.1783 Alton	11.iii.1783 South Lambeth; 25.iii.1783 London; 30.iii.1783 South Lambeth; 11.iv.1783 Newton*; 12.iv.1783 Selborne—34 days.
24.ii.1784 Alton	25.ii.1784 South Lambeth; 2.iv.1784 Seloorne—39 days. Royal Society 18.iii.1784.
18.iv.1785 Alton	19.iv.1785 South Lambeth; 13.v.1785 Alton; 14.v.1785 Selborne—27 days.
14.vi.1786 South Lambeth	22.vi.1786 London; 25.vi.1786 South Lambeth; 29.vi.1786 London; 1.vii.1786 South Lambeth; 7.vii.1786 Alton; 8.vii.1786 Selborne—25 days.
14.v.1787 Marelands**	15.v.1787 South Lambeth; 5.vi.1787 London; 9.vi.1787 South Lambeth; 15.vi.1786 Alton; 16.vi.1787 Selborne—34 days.
2.vi.1788 Alton	3.vi.1788 South Lambeth; 5.vi.1788 London; 7.vi.1788 South Lambeth; 19.vi.1788 London; 22.vi.1788 South Lambeth; 27.vi.1788 Selborne—26 days.
10.vi.1789 South Lambeth	17.vi.1789 London; 21.vi.1789 South Lambeth; 1.vii.1789 London; 2.vii.1789 South Lambeth; 3.vii.1789 Alton; 4.vii.1789 Selborne—25 days.
7.vi.1790 London	12.vi.1790 South Lambeth; 29.vi.1790 London; 1.vii.1790 South Lambeth; 2.vii.1790 Alton; 3.vii.1790 Selborne—27 days.
25.vi.1791 South Lambeth (? from Godalming)	5.vii.1791 London; 7.vii.1791 South Lambeth; 19.vii.1791 Alton; 20.vii.1791 Selborne—26 days, his last visit to London.

*Newton is Newton Valence near Selborne, the home of The Revd Yalden.
**Marelands at Bentley, Hampshire was the retirement home of brother Benjamin.

Book Review

Birds by Colour. The Simplest Identification Guide. By Mike Lambert with illustrations by Alan Pearson. Blandford Press, London. 1992. 160 pp. and 143 pages of colour plates. £8.99. ISBN 0-7137-2295-9.

There are many identification guides to British birds aimed at various parts of the birdwatching market from pure beginner to expert. This guide is firmly aimed at the beginner. It covers 180 of the commonest British species and aims to permit readers to identify birds seen in the field without assuming the knowledge of taxonomy that is the basis of almost all other guides.

The book is divided into six colour sections, each containing birds which fit loosely into the relevant colour classification. The species are then arranged into ten size brackets which are determined by reference to common birds – 'House sparrow', 'House sparrow to blackbird', 'Blackbird', etc. Many species fall into several colour classifications with male red-breasted merganser for instance falling into five of the six categories. Each page deals with five species with a colour illustration opposite a brief comment on identification and status for each. The colour illustrations are of a variable quality and almost without exception have a stiff feeling to them. Some relatively common species such as little gull, water pipit and grasshopper warbler are omitted whilst other much rarer ones such as bittern, capercaillie and stone-curlew are included.

The author certainly adopts a unique approach and one which I find inherently difficult to accept. It seems to me that beginner birdwatchers should be encouraged to learn the basics of taxonomy as soon as possible, which is not as awesome a task as the author seems to imply. However, because of my own preconceived ideas of what a bird identification guide should look like, I decided to 'roadtest' this book on three friends who have very little knowledge of birds. I gave each of them the same photograph of a spring male wheatear and then asked them to identify it by using the book. Two of them got it right, but both took more than ten minutes to do so and the other was adamant that it was a male lesser whitethroat! However when presented with a standard field guide they all got it right and found the bird much more quickly by simply flicking through the book.

I suspect that this book will find a niche in the lower end of the market, but I find it difficult to recommend. Any interested beginner wishing to buy a book to help with identification of common British birds would be better off with one of the basic established field guides.

Mark Hardwick

Book Review

The Practical Entomologist. By Rick Imes. Aurum Press, London. 1992. 160 pp. £14.95. ISBN 1 85410 209 5.

The stated aim of this book is to inform would-be and experienced entomologists where and how to look for insects, how to record what is seen, and how to collect insects. The book is broadly divided into three parts. The first part serves as a general introduction to entomology and starts with a section that defines insects and places them in context with other arthropods. There then follow sections on functional morphology describing anatomy and morphology, mouthparts and feeding, wings and flight, life cycles, senses, behaviour, social insects, offence and defence, pests and beneficial insects. The second part deals with the practicalities of entomology and gives advice on field and laboratory equipment, capturing insects and making a collection, keeping live insects, photography and the importance of keeping a field notebook. The final, and longest, part of the book starts with a simple dichotomous key to the orders. Each order is then treated by a brief description and a few interesting biological titbits are provided. The book is illustrated throughout by line drawings and large colour photographs taken, in the main, by Ken Preston-Mafham, John Feltwell and Michael Tweedie.

The book will provide a good introduction to entomology to those new to the subject. The text is written and presented in a style that will particularly appeal to younger readers, although it is by no means patronising. However, despite the claims on the dust-jacket, I doubt whether experienced entomologists will find much that is new. The text is clearly laid out with snappy subheadings and is generously supplemented with large, high-quality colour photographs of insects in natural conditions. The line drawings are not of such good quality, especially when they are used to illustrate certain morphological features, however they are adequate when used to demonstrate techniques or the use of equipment. One excellent feature of the book is the yellow 'what you can do' boxes that appear at frequent intervals throughout. These comprise suggestions for field or laboratory experiments and investigations and help to point the reader towards interesting lines of research. This kind of direction is essential for those with little entomological experience and will help to prevent the hobby becoming an aimless and ultimately unsatisfying pursuit.

The introductory part of the book provides an adequate overview of the subject and the section on field craft is instructive. There are some excellent suggestions on how to achieve good results photographing aquatic insects under water. However, there is plenty to quibble over such as the suggested ways of pinning Odonata or carding Diptera. Close reading of sections of the text made me wonder what depth of experience the author actually had of entomology since many misunderstandings appear. For example, insecticide fogging of the tree canopy is carried out in still conditions primarily so that the insecticide is not blown onto non-target trees rather than to prevent insects being blown away from the collecting trays. The tip on hand-netting dragonflies is, to say the least, optimistic. The author seems to suggest that the dragonfly will remain obligingly perched while a net is manœuvred to within a few inches of its head whereupon it will fly into the net after it is startled!

Similarly, there are many misleading statements in the final part of the book which discusses each of the insect orders. The key to the insect orders simply will not work since, according to this key, Homoptera is the only group that has the wings held roof-like over the body. Unfortunately, Trichoptera and Neuroptera will also key out at this point. I also found numerous mistakes in the sections dealing with the groups closest to my heart – Odonata, Ephemeroptera and Neuroptera – and similar mistakes may well occur in the sections concerning the other orders. I would consider some of these errors to be rather elementary. For example, there are certainly more than just three families of Ephemeroptera; apparently all Neuroptera have a 'weak fluttering flight', but I think the author forgot to tell that to the Ascalaphidae; the author tells us that all antlions dig pits as larvae, but actually the larvae of only one subfamily of Myrmeleontidae adopt this strategy; Aeshnidae is certainly not the only family of dragonflies whose eyes meet on top of the head (what about Libellulidae and Corduliidae?); in fact, not all Odonata copulate in the air, as stated by the author, only some libellulids. I noticed many more such howlers. I can only hope that novice entomologists, on using the book, will soon discover for themselves that these comments are erroneous and will not be misled for long.

The book is attractively packaged and will be of practical use to school children or others with little grounding in entomology. However, the many errors of detail are unsatisfactory and detract from the overall authority of the book.

Stephen J. Brooks

Heritage Land: the Case for Fryent Country Park

By L. R. Williams* and K. Northcroft**

Abstract

This paper supports the suggestion in the draft Brent Unitary Development Plan that Fryent Country Park should be recognised as Heritage Land, a relatively new concept in landscape designation. The paper reviews the habitat history, vegetation and landscape of the Country Park, an area of traditional countryside in Middlesex (London). Emphasis is placed on the floristic indicators of historical habitats. The comparison between the features of the Country Park and the criteria of the Heritage Land concept are discussed. Fryent Country Park appears to fulfil all the criteria for designation as Heritage Land.

Introduction

Fryent Country Park is a 103-hectare remnant of the rural countryside of Middlesex, now in the London Borough of Brent. Surrounded by suburban London, bisected by the A4140 Fryent Way and located about 15 km north-west of central London, the Country Park presents a semi-natural landscape, still farmed but generally having escaped intensive agricultural practices. The Park is typical of the former rural landscape of the upper Brent basin. It is almost entirely on London Clay, though with some pebble gravel capping Barn Hill. Fryent Country Park encompasses parts of the former parishes of Kingsbury and Harrow (Wembley) and over one kilometre of the parish boundary hedge survives. Barn Hill, which rises to 86 metres above mean sea level (O.D.), was landscaped as part of the Wembley Park estate of Richard Page by Humphry Repton in 1793. Two other hills, Beane Hill and Gotfords Hill, rise to about 65 and 63 metres O.D. respectively.

The Park is largely in the London Natural History Society's tetrad 18T86, with smaller areas in 18T88, 28T06 and 28T08.

The wildlife and habitats of Fryent Country Park have been the subject of considerable survey and monitoring during the last decade. Now is an opportune time to review the landscape and its constituent features. In particular this information can be considered for the Unitary Development Plan that is under preparation by Brent Council Development Department (1991) to serve as the planning framework for the next decade.

Heritage Land

The Countryside Commission (1988) proposed the concept of Heritage Land and defined it as 'extensive areas of open land that are of strategic importance in London because of their combined value for landscape, historical interest and nature conservation, and which should be protected and managed accordingly. Special attention should be given to providing appropriate access to heritage land for informal recreation and education.

'Notes:
'– landscape value includes designed landscapes and "semi-natural" or "natural" landscapes such as agricultural areas or natural geomorphological formations,
'– historical interest includes both the artistic interest of a designed landscape and the interest of ancient or traditional countryside and archaeological features,

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**Barn Hill Conservation Group.

'– nature conservation interest embraces wildlife interest and features or landforms of geological or geomorphological interest.'

The Countryside Commission considered four main characters in identifying heritage land:

- visual attractiveness of the landscape
- historical interest of parks and gardens
- interest as ancient or traditional countryside
- nature conservation value.

Fryent Country Park

The historical landscape of Fryent Country Park consists of a mosaic of constituent features that have evolved over several centuries. While this landscape, like other historic landscapes, must be considered as a unique whole, the clarity of the description will be enhanced if features are listed individually. Botanical names follow the order in Clapham, Tutin and Moore (1987). Figures 1 and 2 locate the main features mentioned in the text.

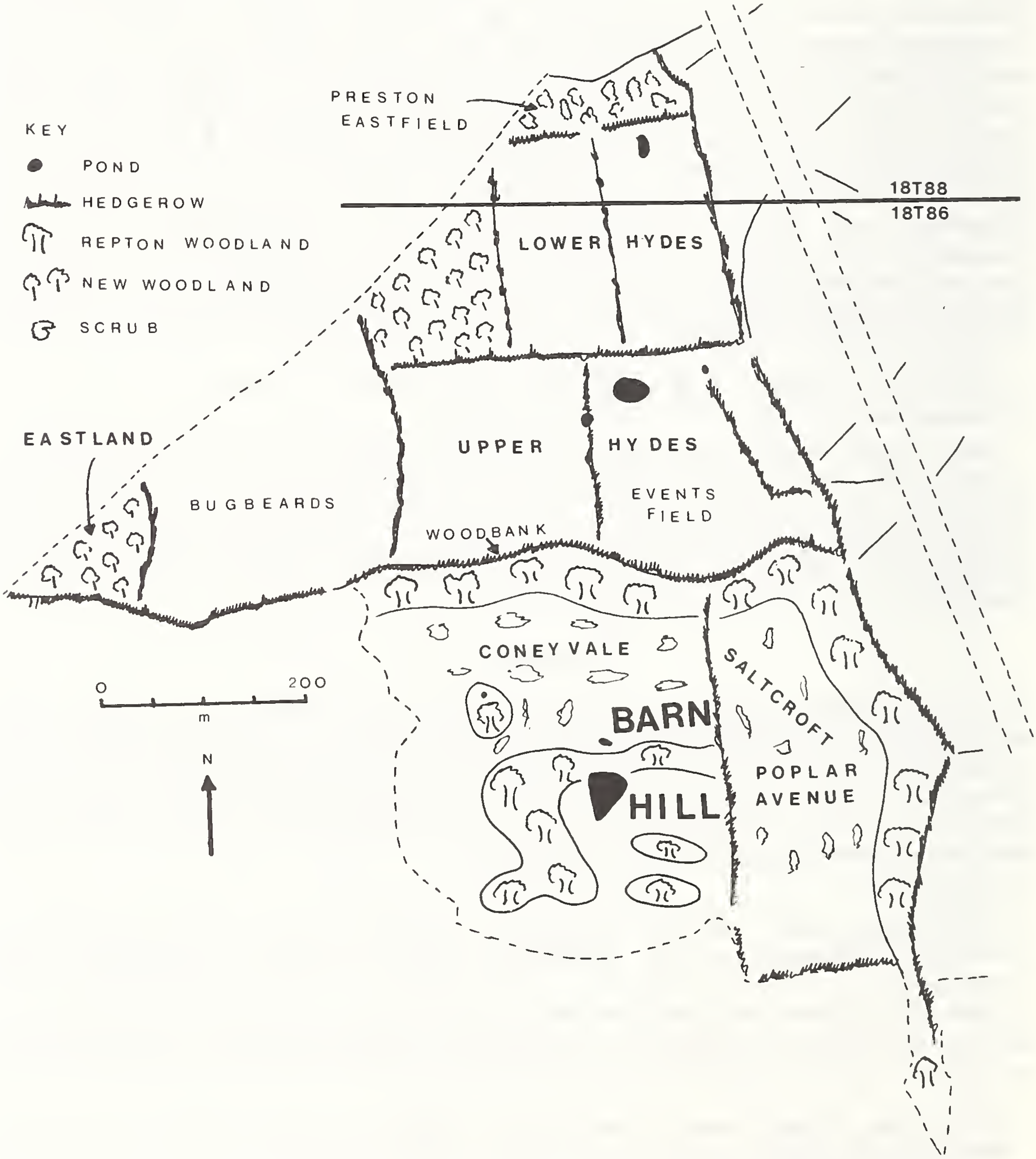

FIG. 1. Sketch map of the Harrow (Wembley) parish side of Fryent Country Park.

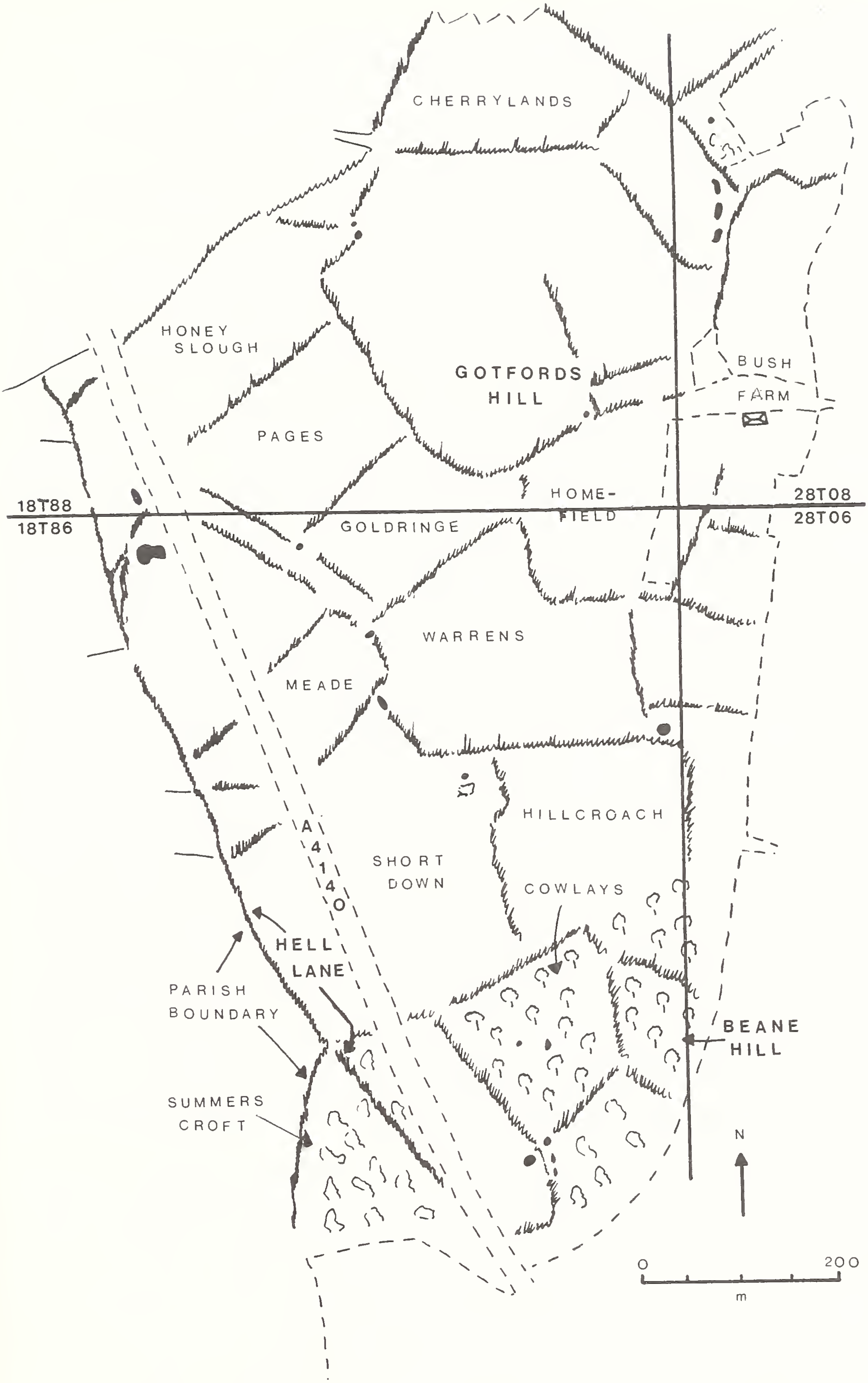

Fig. 2. Sketch map of the Kingsbury parish side of Fryent Country Park. Refer to Figure 1 for the key.

Parish Boundary and Green Lane

Fryent County Park straddles the boundary between the former parishes of Kingsbury to the east and Harrow to the west. The area in Harrow was more closely associated with Wembley, though it was not until 1894 that Wembley became a parish in its own right. The parish boundary follows an approximately north–south route for one kilometre across the Country Park and the Moot site of the Hundred of Gore (Braun 1937*a*) was reached about 500 metres north of the Country Park. The boundary is now represented by a hedgerow and the vegetation is similar to the older hedgerows of the Country Park.

Towards the south of the Park, the parish boundary is joined by a green lane, known as Eldestrete or Hell Lane. The parish boundary and the green lane continue northwards together, with the trackway within the double hedgerow. Braun (1937*b*) provided evidence that this was part of a trackway from London via Dudden Hill Lane, Neasden Lane, the southern section of Salmon Street, then as Hell Lane, past the Moot site and then continued northwards as Honeypot Lane to Stanmore and Hertfordshire.

Some restoration work to both the trackway and the parish boundary hedges has been undertaken at the southern end of the Park where both were adjacent to temporary housing after the Second World War.

Hedgerows

The 10 km of hedgerows in the Country Park were surveyed by Williams and Cunnington (1985) and represent one of the best hedgerow landscapes surviving in Middlesex. In straddling the two parishes, the Country Park also straddles two hedgerow systems which were representative of the two major hedgerow systems of English landscape history. Indeed, the two parishes exemplify the field systems of parishes to the west and to the east in Middlesex and counties beyond. The eastern pattern is of irregular fields which were cut out of the original woodland by assarting. The hedgerows were not therefore planted, but represent remnants of woodland. To the west, there is a more regular field pattern including planted hedgerows which were used to subdivide large open and other fields. Traditionally this hedgerow planting was associated with the Enclosure Acts, but in this area of Harrow illegal subdivision of fields had occurred on a piecemeal basis over several centuries prior to the Enclosure Act of 1805.

Characteristic species of the older hedgerows of both systems include field maple *Acer campestre,* field rose *Rosa arvensis,* dog rose *R. canina,* blackthorn *Prunus spinosa,* woodland hawthorn *Crataegus laevigata,* common hawthorn *C. monogyna,* hybrid hawthorn *C. × media,* wild service *Sorbus torminalis,* crab apple *Malus sylvestris,* dogwood *Cornus sanguinea,* English elm *Ulmus procera,* hazel *Corylus avellana,* pedunculate oak *Quercus robur,* crack willow *Salix fragilis,* wild privet *Ligustrum vulgare,* ash *Fraxinus excelsior* and elder *Sambucus nigra.* Spindle *Euonymus europaeus* and pear *Pyrus communis* were found in one hedge each on the Kingsbury side of the Park. The English elm was of planted origin.

There is a typical hedgerow ground flora including lesser celandine *Ranunculus ficaria,* red campion *Silene dioica,* greater stitchwort *Stellaria holostea,* brambles *Rubus fruticosus* agg., stone parsley *Sison amomum,* white bryony *Bryonia dioica,* dog's mercury *Mercurialis perennis,* bluebell *Endymion non-scriptus,* black bryony *Tamus communis,* cuckoo-pint *Arum maculatum* and bushgrass *Calamagrostis epigejos.* Other species, confined to the woodbank are considered below. The hedgerows support several colonies of narrow-leaved bitter-cress *Cardamine impatiens,* the only Middlesex or London site for this nationally scarce species (Nature Conservancy Council *c.* 1985). Under favourable conditions this species has established colonies in adjacent scrub, on streamsides and in disturbed ground habitats.

Woodbanks

On the lower slopes of Barn Hill the eastern and northern boundaries of the hill are represented by a woodbank. The eastern boundary also marks part of the parish boundary and Hell Lane mentioned above. A belt of woodland on the uphill side of both the eastern and northern woodbanks forms part of the Humphry Repton landscape mentioned below. However, despite these problems of demarcation, the woodbank is a substantial feature and on the northern side may represent the sinuous boundary of a former ancient wood on Barn Hill. Within the Country Park, some species often associated with ancient woodland are virtually confined to the woodbank. These include wood anemone *Anemone nemorosa,* goldilocks *Ranunculus auricomus,* enchanter's nightshade *Circaea lutetiana,* wood sedge *Carex sylvatica,* tall brome *Festuca gigantea,* wood poa *Poa nemoralis,* hairy brome *Bromus ramosus,* slender false-brome *Brachypodium sylvaticum* and wood millet *Milium effusum.*

Humphry Repton woodland

Barn Hill was landscaped by Humphry Repton in about 1793 when it was part of the adjacent Wembley Park estate owned by Richard Page. The landscaping consisted of belts of woodland on the summit of Barn Hill and around the lower slopes of the Hill where the Park bounded other properties. At one time these belts continued around Wembley Park, but these have been largely lost to building development during the twentieth century, though some belts also survive amongst the suburban housing of Barn Hill and along Forty Lane and Forty Avenue. The pond on the summit of Barn Hill was constructed as part of the landscaping, though the summit folly was demolished before completion. This landscape was one of Repton's earlier works and has been described by Williams, Cunnington and Hewlett (1985).

Repton planted several woodland belts alongside hedgerows and where he used native species it is not always obvious whether individual trees were planted by Repton or are part of a hedgerow. Certainly, this achieved the objective of establishing a natural-looking landscape. Of the species native to the area, Repton used field maple, wild cherry *Prunus avium,* English elm, penduncculate oak and ash. Introduced species included common lime *Tilia × vulgaris,* sycamore *Acer pseudoplatanus,* horse chestnut *Aesculus hippocastanum,* hornbeam *Carpinus betulus,* beech *Fagus sylvatica,* sweet chestnut *Castanea sativa* and Turkey oak *Quercus cerris.*

Grass heath

Grass heath occurs on Barn Hill where it approximates to the area of Coneyvale field. Pedunculate oak scrub has developed over much of this area, though a programme of coppicing has been established to maintain grassland between the coppice stools, on footpaths and in glades. There is considerable gravel downwash from the summit of Barn Hill and a pH as low as 4.0 has been recorded. Williams and Bertrand (1988) provided a description of this grassland and several additional species have been found since then. The major grassland species are the bents *Agrostis* spp., red fescue *Festuca rubra,* Yorkshire fog *Holcus lanatus,* creeping soft grass *H. mollis* and sheep's sorrel *Rumex acetosella.* Other species include the moss *Polytrichum commune,* bird's-foot-trefoil *Lotus corniculatus,* large bird's-foot-trefoil *L. uliginosus,* gorse *Ulex europaeus,* pignut *Conopodium majus,* burnet saxifrage *Pimpinella saxifraga,* sorrel *Rumex acetosa,* devil's-bit scabious *Succisa pratensis,* wood groundsel *Senecio sylvaticus,* yarrow *Achillea millefolium,* lesser knapweed *Centaurea nigra,* cat's-ear *Hypochaeris radicata,* autumnal hawkbit *Leontodon autumnalis,* hawkweed *Hieracium sabaudum,* mouse-ear hawkweed *H. pilosella,* oval sedge *Carex ovalis* and early hair-grass *Aira praecox.* Bracken *Pteridium aquilinum* occurs on the boundary of Coneyvale and Saltcroft.

Old neutral grassland on Barn Hill

Adjacent to Coneyvale is the field of Saltcroft which also appears to have been grazed in the past, but which has a more-neutral grassland vegetation. The major species include red fescue, Yorkshire fog and bent grasses as in Coneyvale, but together with tufted hair-grass *Deschampsia cespitosa,* oat-grass *Arrhenatherum elatius* and creeping thistle *Cirsium arvense.* While there is some overlap of species with Coneyvale the flora includes adder's tongue fern *Ophioglossum vulgatum,* lesser stitchwort *Stellaria graminea,* creeping cinquefoil *Potentilla reptans,* common agrimony *Agrimonia eupatoria,* pepper saxifrage *Silaum silaus,* figwort *Scrophularia nodosa,* betony *Stachys officinalis,* bugle *Ajuga reptans,* sneezewort *Achillea ptarmica,* marsh thistle *Cirsium palustre,* carnation sedge *Carex flacca,* hairy sedge *C. hirta,* hybrid fescue × *Festulolium loliaceum,* yellow oat grass *Trisetum flavescens* and sweet vernal-grass *Anthoxanthum odoratum.* The scrub consists of a variety of species and one butcher's broom *Ruscus aculeatus.*

Hay meadows

The hay meadows and associated neutral grasslands occupy 27 fields and over half of the Country Park area. Land management records prior to the 1980s are few, though grazing and hay cutting appear to have been the predominant land uses over several centuries. Some of the fields appear to have been ploughed during the Second World War and in the late 1960s/early 1970s. Haymaking, undertaken by contractors in the summer, has been the major management during the past decade. Hare (1988) identified three mesotrophic grassland (MG) types amongst the hay meadows in addition to type MG7 of the events field, which is a semi-improved rye-grass ley. The majority of the hay meadows on the east side of the Park were of type MG1 in which oat-grass has increased in frequency during recent years, while rye-grass *Lolium perenne* has declined. Other species include meadow buttercup *Ranunculus acris,* creeping buttercup *R. repens,* common mouse-ear chickweed *Cerastium fontanum,* cut-leaved cranesbill *Geranium dissectum,* white clover *Trifolium repens,* red clover *T. pratense,* meadow vetchling *Lathyrus pratensis,* hoary ragwort *Senecio erucifolius,* creeping thistle *Cirsium arvense,* goat's-beard *Tragopogon pratensis,* salsify *T. porrifolius,* rough meadow-grass *Poa trivalis,* cocksfoot *Dactylis glomerata,* soft brome *Bromus hordeaceus,* meadow brome *B. commutatus,* couch *Elymus repens,* Yorkshire fog *Holcus lanatus,* cat's-tail *Phleum bertolonii* and meadow foxtail *Alopecurus pratensis.* The annual legumes, lesser yellow trefoil *Trifolium dubium,* hairy tare *Vicia hirsuta* and common vetch *V. sativa,* have had dramatic fluctuations in frequency probably in response to climatic factors. Meadow brome is sensitive to the continuation of annual hay meadow management, while the creeping thistle has spread rapidly and may require a change of management for effective control.

The MG6 type meadows on the west side of the Park had a similar flora, though at different frequencies. Towards the north of the Park are three fields of type MG4, which is rare in London, and there is a large population of great burnet *Sanguisorba officinalis.*

The total number of plant species found in these three meadow types is 125, to which can be added a further 74 found on the disturbed ground of fields on the west side of the Park as a result of a traveller occupation from 1986 to 1990. Many of these additional species, were however, introductions.

Ponds

Until the early decades of this century, the London Clay areas of rural Middlesex were well endowed with ponds. Twelve old farm ponds have been restored at Fryent Country Park and a further 14 new ponds have been created during the 1980s. Williams (1990) described the flora of these ponds and mentioned the difficulty of listing accurately the original flora native to the area.

The following species were almost certainly part of this pond flora: *Chara vulgaris,* celery-leaved buttercup *Ranunculus sceleratus,* common water-crowfoot *R. peltatus,* wood bitter-cress *Cardamine flexuosa,* creeping yellow-cress *Rorippa sylvestris,* marsh yellow-cress *R. palustris,* the starworts *Callitriche stagnalis* and *C. hamulata,* sharp dock *Rumex conglomeratus,* crack willow *Salix fragilis,* common sallow *S. cinerea,* marsh cudweed *Gnaphalium uliginosum,* water plantain *Alisma plantago-aquatica,* pondweed *Potamogeton natans,* toad rush *Juncus bufonius,* hard rush *J. inflexus,* soft rush *J. effusus,* conglomerate rush *J. conglomeratus,* jointed rush *J. articulatus,* duckweed *Lemna minor,* branched bur-reed *Sparganium erectum,* hairy sedge *Carex hirta,* false fox-sedge *C. otrubae,* flote-grass *Glyceria fluitans,* tufted hair-grass and marsh foxtail *Alopecurus geniculatus.*

The largest pond in the Park is that on the summit of Barn Hill, where it was created as part of the Humphry Repton landscaping in the 1790s and is now used as a fishpond. Almost all the ponds have common frog *Rana temporaria* and smooth newt *Triturus vulgaris* populations.

Bush Farm

While the whole Country Park is a remnant of a farmed countryside and is still farmed to some extent, little remains of the farmsteads. Apart from the Barn Hill estate which was administered from Wembley Park, there were farms at Uxendon in Wembley and three along the eastern fringe of the Country Park area where they had access to Salmon Street. These were Hill Farm on the high ground at Beane Hill, Little Bush Farm and Bush Farm. Rubble from the demolished buildings at Bush Farm has been found beneath the surface over a large area. A stables building, of little architectural interest, survives and is used by a riding club. Two composite fields are used for horse grazing and the flora is typical of poorly-drained, heavily poached ground including creeping buttercup, knotgrass *Polygonum aviculare,* great plantain *Plantago major* and annual poa *Poa annua,* while broad-leaved dock *Rumex obtusifolius* and ragwort *Senecio jacobaea* are visually prominent in the summer.

A standard poplar *Populus* × *canadensis* was planted in the farmstead and two more nearby in a hedge on the summit of Gotfords Hill. Other standard trees of the farmstead include a horse chestnut *Aesculus hippocastanum,* an oak *Quercus robur* and an ash.

Orchard

The Bush Farm orchard had been largely cleared this century and incorporated into the horse grazing until restoration commenced in 1989. An unidentified *Prunus,* a mulberry *Morus nigra* and hop *Humulus lupulus* had survived the horse grazing. Since 1989, 55 species and varieties of native wild and older cultivated fruits have been planted in the orchard.

Lombardy poplar avenue

An avenue of Lombardy poplars *Populus nigra* cv. Italica forms a prominent landmark on the eastern slope of Barn Hill, though this is at variance with the natural landform of the surrounding woodland. They may have been planted to commemorate King George V's Silver Jubilee in 1935.

New woodland

Since the mid-1980s new woodlands have been planted at Little Cowlays, Beane Hill, Lower Hydes and Eastland, with the intention of creating coppice woodland. These were all former agricultural fields of rough grassland where scrub development had commenced. The planted species include ash, alder *Alnus glutinosa* and sweet chestnut. A variety of potential standard trees was also planted and the scrub was retained. This work was aided by the Forestry Commission's woodland grant schemes.

Scrub

Scrub woodland has also become established at Summers Croft, Great Cowlays and at the remnant of Preston Eastfield.

Landmarks and viewpoints

Barn Hill and Gotfords Hill are local landmarks. Views of the fields, hedgerows and woodlands can be obtained from Fryent Way. Viewpoints within the Park include Barn Hill, Gotfords Hill and Beane Hill. The woodland landscaping at Barn Hill was so designed by Humphry Repton that it would be possible to view his fishpond, the mansion house in Wembley Park and St Paul's Cathedral from the site of his folly. The dome of St Paul's can still be seen, together with the British Telecom Tower and the Canary Wharf development. Wembley Stadium is now the central feature in the Wembley Park area.

Monitoring and research

The Country Park has hosted a variety of survey and research projects. Monitoring is undertaken to determine the effectiveness of the habitat management work. Summer water levels in the ponds and frogspawn counts have been undertaken since the early 1980s, annual hay meadow monitoring commenced in 1984 and butterfly transects in 1985 (Williams *et al.* 1991). Farmland and woodland Common Bird Census plots have been established by a volunteer team, while an earlier account of the birdlife was researched by Batten (1972).

Management

The Country Park is managed by Brent Council and has a reputation for community involvement. Much of the habitat management work is undertaken by the volunteer Barn Hill Conservation Group, assisted by the Friends of Fryent County Park, who organise the annual Countryside Day, and by the Kingsbury Walkers.

Discussion

Two simultaneous arguments are made in this paper. The first, implicit in the accounts above, is that Fryent Country Park is a historical landscape, uniquely preserving many of the natural features that were typical of rural Middlesex. By the survival of this landscape and its constituent features which have developed over many centuries, the habitats and their wildlife have also been conserved.

The second argument, presented in the discussion below, compares the Park's features with the criteria for identification of Heritage Land. The inference is that Fryent Country Park should be Heritage Land.

Heritage Land is a concept, rather than a statutory designation. The concept was developed in consultation with the London Ecology Unit and English Heritage; and a report prepared jointly by the Countryside Commission and the Nature Conservancy Council (now English Nature) was presented as advice to the London Planning Advisory Committee and the Secretary of State for the Environment (Countryside Commission 1988). There is considerable potential for such proposals to be incorporated into the Unitary Development Plans which the London boroughs are under a statutory obligation to prepare and which will guide planning decisions for the next decade and further. Aside from the planning system, there is potential for more popular recognition of Heritage Land by the public.

As a new concept, Heritage Land emphasises a combination of values. Most statutory designations recognise sites which are of strategic importance primarily for a single reason, e.g. Areas of Outstanding Natural Beauty for scenery, Sites of Special Scientific Interest for wildlife, or Conservation Areas for architectural merit. The Countryside Commission argues that proposed sites on its Heritage Land list are open land of great character or interest, but may not rate highly enough nationally to be specially protected for one reason alone. However, those sites with a combination of, for example, fine views, interesting landforms, archaeological monuments, past land use as a park or as a working agricultural landscape, develop a composite inherent value over a period of centuries. Such landscapes need to be properly recognised; protected through the planning system and appropriately managed to conserve those landscapes.

Heritage Land has been defined as extensive areas of open land that are of strategic importance in London because of their combined value for landscape, historical interest and nature conservation, and which should be protected and managed accordingly. Access to Heritage Land for informal recreation and education should be promoted.

Fryent Country Park is certainly as large as some of the potential candidates identified by the Countryside Commission in London. The Park's planning status as open space was recently reaffirmed in an upgraded form of Metropolitan Open Land in the draft Brent Unitary Development Plan (Brent Council Development Department 1991). As Brent's largest park and only Country Park it is accessible for informal recreation at all times, it can be used by schools for educational purposes, and long-term research at the Park has been outlined above. The Park also offers both the physical aspects and the human needs of two other functions, in that it is both a farm and a community woodland. Again these are not statutory designations, but are images strongly associated with the management of the estate.

The four inherent values or characteristics used to identify Heritage Land are well presented at Fryent Country Park:

1. Visual attractiveness of the landscape

Visual attractiveness is a subjective assessment though areas of countryside or natural features with a coherent scenery and identity rank strongly. Fryent Country Park presents attractive views of traditional countryside with meadowland, hedgerows, gently sloping hills and small woods. Although surrounded by suburbia the landscape has escaped the effects of intensive modern agriculture; and the dullness of municipalisation.

2. Historical interest of parks and gardens

The historical pattern of fields, hedgerows, the parish boundary and a green lane, have been documented above, as was the surviving Humphry Repton landscape of Barn Hill. The woodland belts comprise a substantial part of the former Wembley Park landscaping. Following the urban development of Wembley Park, most authorities on Repton's works have overlooked the fact that much of his scheme still survives on adjoining Barn Hill and this landscape is worthy of a wider recognition.

3. Interest as ancient or traditional countryside

Fryent Country Park is one of the best surviving areas of traditional countryside in Middlesex and certainly in the Brent area. Straddling the boundary of and displaying examples of two of the main field and hedgerow systems used in Britain, adds to this interest. On the Kingsbury side of the Park, the field and hedgerow pattern has survived so well that the Hovenden map of Kingsbury (All Souls College 1597) can still be used for navigation. The continuation of traditional forms of agriculture, for example haymaking, is one of the aims of the management plan (Brent Parks 1992).

4. Nature conservation value

The habitat descriptions with accounts of their typical and increasing rare flora indicate the importance of the Park's habitats. Note that the accounts concentrated on the flora, as was appropriate for describing historical land management. The associated invertebrate fauna and other wildlife are no less important. The Greater London Ecology Unit (1987) considered the Park to be a Site of Metropolitan Importance. In 1991, Brent Council designated Fryent

Country Park a Local Nature Reserve under the provisions of the National Parks and Access to the Countryside Act, 1949.

The Countryside Commission proposed 17 sites in London and a possible eight more are candidates for Heritage Land status. Fryent Country Park was not on the list, though it is possible that in the mid-1980s when the report was prepared, information of the wildlife value and historical interest of the park and of the Repton landscape was not generally available. The presence from 1986-90 of a large traveller encampment in the centre of the Park would not have been conducive to discussions of landscape value.

The Brent Draft Unitary Development Plan (Brent Council Development Department 1991) recommended the designation of the Country Park as Heritage Land. London boroughs appear to have the powers of designation, though consultation is recommended. In the light of current knowledge, it is argued that Fryent Country Park is an ideal candidate for Heritage Land status.

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A Study of Urban Fungi in the London Borough of Haringey, 1983-1991

By Keith Thomas*

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Abstract

Fungus records from the London Borough of Haringey are reported in detail for the years 1983 to 1991. The records illustrate that a range of species occurs in the Borough and that many species common to rural habitats were present.

A more detailed comparison of specific sites with different habitats was conducted in 1989, 1990 and 1991 to determine whether species varied or were restricted in their location. Few differences were noted in this comparison although parkland and wasteland sites generally produced fewer and more variable numbers of species.

Edible and poisonous species are listed and an analysis of heavy metals indicates high levels in some edible samples.

Introduction

For many years fungus forays have been attracted to potentially rich habitats in order to record the widest range of species. As a result many have been in rural sites leaving urban locations with only occasional recording. While this is an understandable approach for foray organisers fungi are readily recorded in towns and cities and the urban environment presents a variety of challenges for study. Increasing interest is being focused on urban wildlife in general and fungi pose specific issues for concern in the light of pollution and population pressures (Jansen 1990, Pugh 1987). Moreover with increased interest being shown in fungi by amateur naturalists it is of value to document recordings for future comparisons.

Studies in Germany (Lawrynowicz 1982) have provided some important results whereby fungal occurrence may be correlated to urban pollution. Similar studies in British urban habitats are, however, rare despite increased interest in fungi at both professional and amateur levels.

The results reported in this study reflect foray records gathered since 1983 of occasional and specific recording by wildlife groups and interested individuals.

In addition a more detailed survey of specific sites was conducted in 1989, 1990 and 1991 to provide a comparison of habitats and obtain some information on dispersal and consistency of occurrence.

Particular questions addressed by these surveys covered the following issues:

1. Diversity

How wide is the range of fungi within the Borough and how does it compare with the range of fungi found in rural habitats?

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2. Frequency of occurrence

Which species are the most and the least frequent throughout the Borough's sites and through the period of recording?

3. Habitat range

Do the fungi within the Borough reflect the habitats present which include established woodland, new parkland and urban wasteland? Are particular indicator species found in particular habitats?

4. Edible and poisonous species

What is the range of edible and poisonous species present? Urban populations are quite concentrated and many more people may encounter such fungi than in rural environments. Publicising a list of those species present within a local area may be of value to local hospitals and to schools.

Procedures

Occasional recordings

Occasional records of fungi within the Borough of Haringey were collated for the years 1983 to 1991. Recordings were made by individuals, by natural history groups and on organised forays. Unconfirmed records are excluded and the listings are likely to be an underestimate of the species present. Records for 1990 and 1991 show that up to 20 per cent of specimens found were unidentified (Tables 5 and 6).

These records thus indicate the unambiguous species present in the Borough and, although incomplete, do act as a reference for positive sightings of the fungi listed. They also provide a record of the frequency of occurrence around the Borough and through the years of observation.

Specific habitat comparison

To compare habitats more exactly, specific forays were organised on the last weekend of October in 1989, 1990 and 1991.

Fungi were surveyed by keen amateurs including members of the British Mycological Society, the Haringey Wildlife Group and the London Natural History Society. Identification of species was conducted at a workshop session after the foray and subsequently by members using standard microscopical techniques.

A range of 11 major sites was visited during the forays, representing woodland, parkland, wasteland, cemeteries and reclaimed railway land. Not all of these sites were visited each year, but a core of four sites was consistently visited with the full 11 sites being covered in 1989. Only specimens with confident identifications are included in the checklist although other, unidentified, specimens were recorded in some sites and are used in comparative analyses of total numbers or families where relevant.

Determinations of species density were not made although some indication of frequency of occurrence is obtained when records over a period of years and across a number of sites are compared.

Habitat locations and descriptions of the sites are given in Appendix I.

Duplicate soil samples from the first and second 5 cm of five sites were taken and analysed for pH, moisture and organic content.

Moisture was determined by drying at 105°C until of constant weight and organic content by ashing at 500°C until of constant weight. The pH was measured on a fresh suspension of soil sample using a pH meter.

Samples of common edible species collected in 1990 were analysed for heavy metals by graphite furnace atomic absorption.

Results and Discussion

The full checklist of fungi found in the Borough is listed in Appendix II and comprises 243 species. The locations of the records are identified by two keys, one for occasional recordings and another for the specific site surveys conducted in 1989, 1990 and 1991.

Names are based on the standard works included in the bibliography.

1. Diversity of fungi

An indication of the diversity of fungi in Haringey can be made from both the general records and from those collected on the specific site surveys.

The distribution of all fungal species recorded among the classes of macro-fungi is shown in Figure 1.

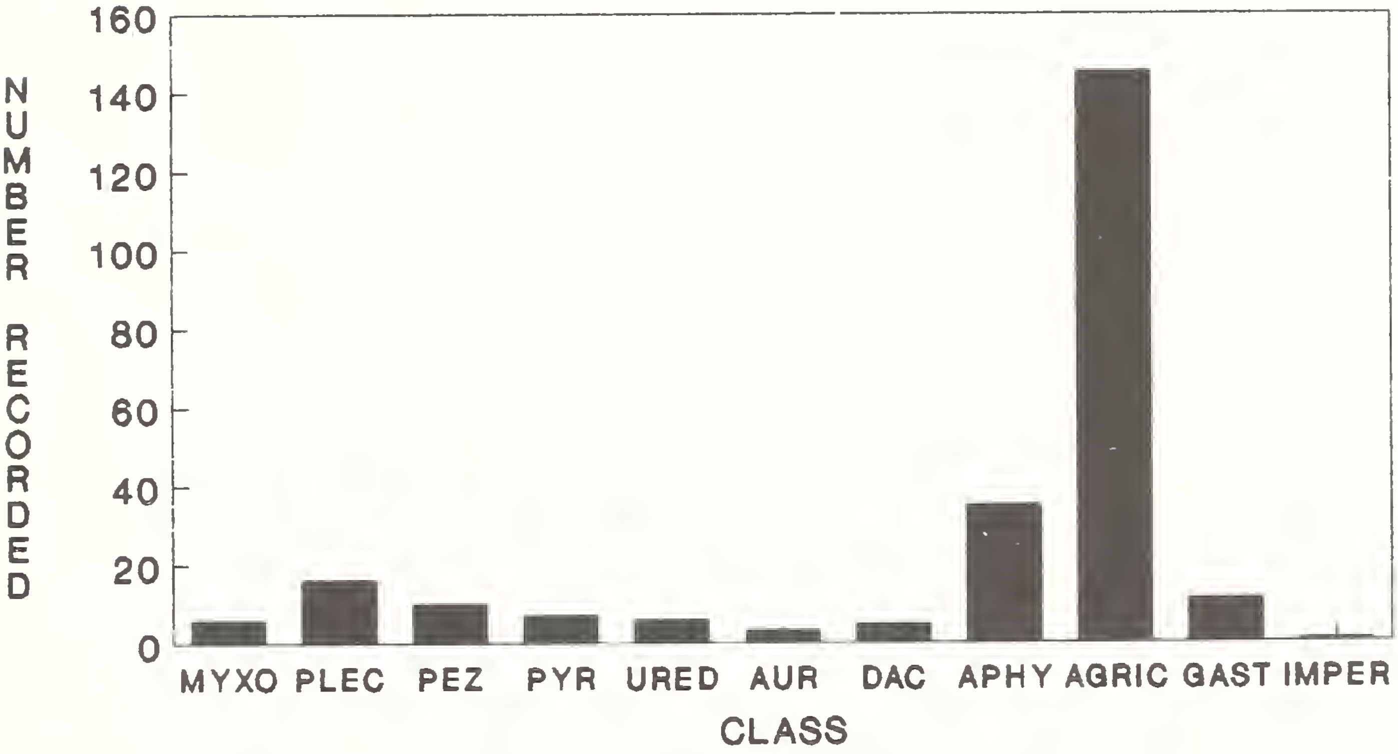

FIG. 1. Class distribution of Haringey fungi, 1983 to 1991.

Key: MYXO = Myxomycetes
PLEC = Plectomycetes
PEZ = Pezizomycetes
PYR = Pyrenomycetes
URED = Uredinales
AUR = Auriculariales
DAC = Dacromycetales
APHY = Aphyllophorales
AGARIC = Agaricales
GAST = Gasteromycetales
IMPER = Fungi Imperfecti

As with most forays, the majority of fungi found were agarics and Aphyllophorales (58 and 14 per cent respectively). Members of all other classes were also recorded although their respective proportions doubtless reflect the participation of different experts in the study as well as their presence at the sites.

A further analysis of the records of agaric fungi indicates a more intermittent spread amongst families as shown in Table 1.

This comparison indicates that most families are represented in the Borough although in very different proportions.

Again this may be partly explained by the recorders' abilities, but with such a long study period involved the totals are likely to be a reasonable indication of distribution within the Borough. The absence and low recording of certain groups may then be of interest as an indication of an incompatibility of those groups with the Borough's habitats or possibly a common susceptibility to pollution or site management.

2. Frequency of occurrence

The frequency of occurrence of Aphyllophorales, Agaricales and Gasteromy-

TABLE 1. Agaric family distribution.

Family	No. recorded
BOLETACEAE	7
RUSSULACEAE	16
HYGROPHORACEAE	2
PLUTEACEAE	3
TRICHOLOMATACEAE	50
ENTOLOMATACEAE	1
CORTINARIACEAE	11
CREPIDOTACEAE	0
STROPHARIACEAE	9
BOLBITIACEAE	4
COPRINACEAE	20
AGARICACEAE	13
AMANITACEAE	5
TOTAL	141

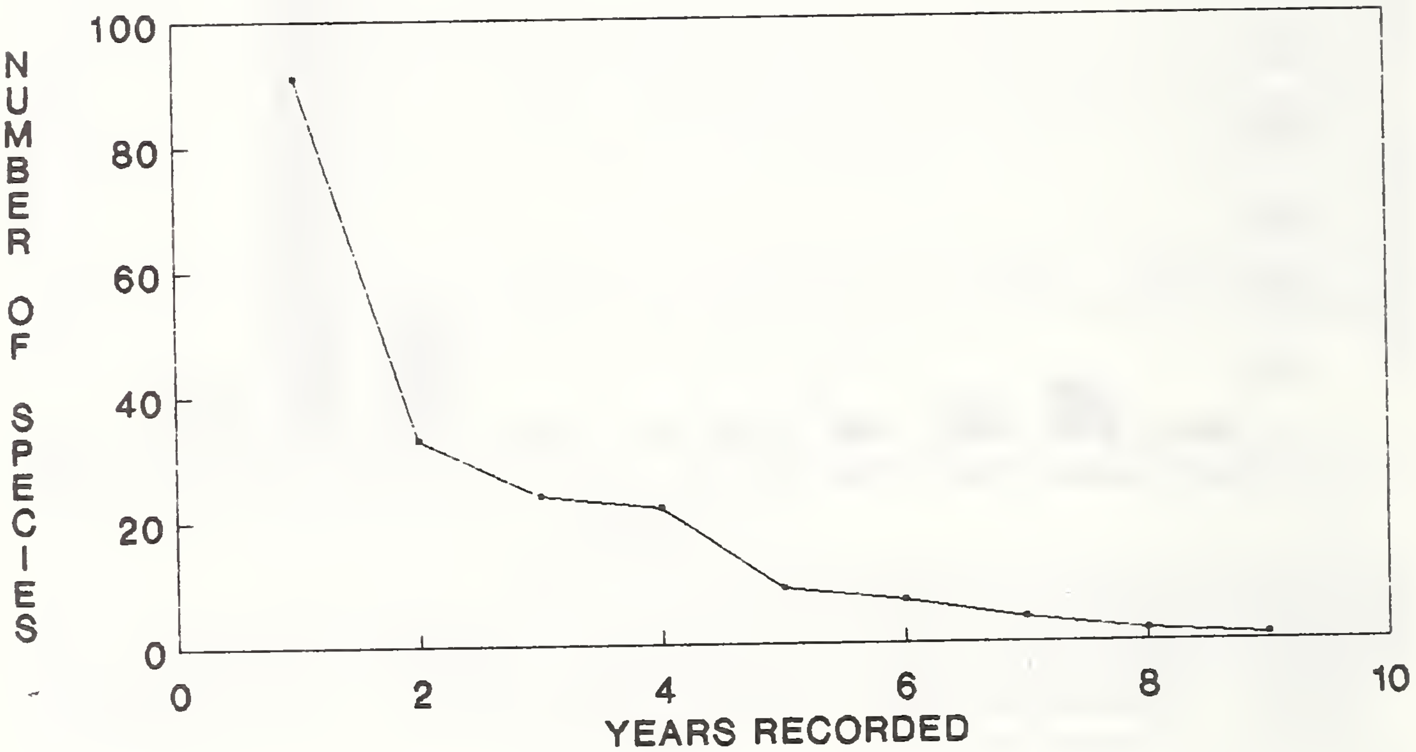

FIG. 2. Recording frequency of Haringey fungi. Yearly summary, 1983-1991.

cetales was analysed for the years 1983 to 1989 to determine the number of years each species was recorded. Other groups of fungi are excluded from this analysis because of variation in the attendance of experts in these groups. The results are shown in Figure 2.

From this it may be seen that while many species are only recorded for one year, 53 per cent were recorded for two or more years. Such a frequency curve is similar to other frequency comparisons for fungi (Rayner 1979, Hack 1983).

The seven most commonly recorded species over the nine years were *Coriolus versicolor* (nine years); *Hypholoma fasciculare, Marasmius oreades* (eight years); *Armillaria mellea, Coprinus micaceus, Coprinus plicatilis* and *Paxillus involutus* (seven years).

When the number of recordings of fungi in these major groups recorded at specific sites in 1989, 1990 and 1991 is summarised a pattern is seen similar to that of the overall yearly totals as shown in Figure 3.

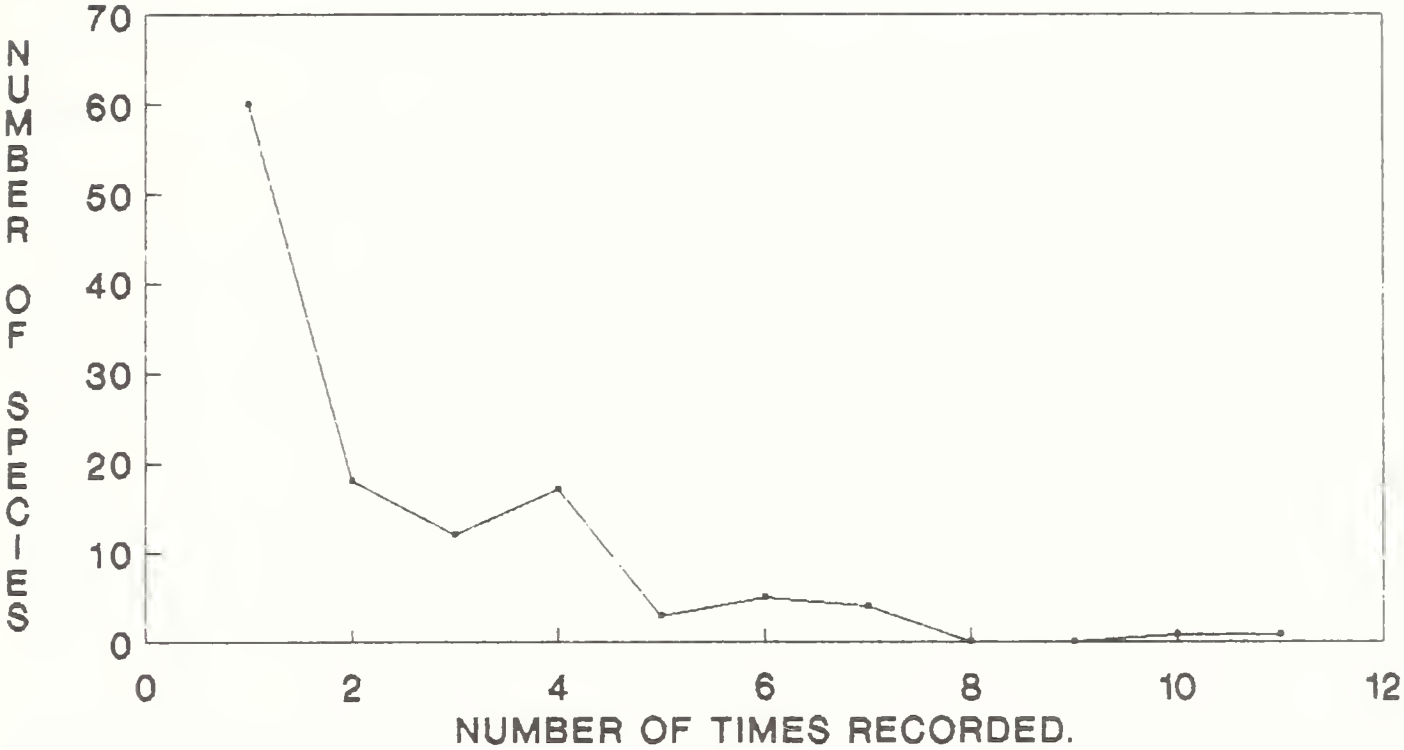

FIG. 3. Recording frequency of Haringey fungi. Site summary, 1989-1991.

The 11 most common species on these sites were:

Hypholoma fasciculare	11 records	*Coprinus comatus*	6 records
Marasmius oreades	10 records	*Lacymaria velutina*	6 records
Agaricus campestris	7 records	*Lyophyllum decastes*	6 records
Coprinus plicatilis	7 records	*Mycena galericulata*	6 records
Coriolus versicolor	7 records	*Stereum hirsutum*	6 records
Lepista nuda	7 records		

It is interesting that four of these most common species are widely reputed edible fungi: *Marasmius oreades, Agaricus campestris, Lepista nuda* and *Coprinus comatus*. With the continuing interest in edible macrofungi it will be interesting to note whether the frequency of occurrence of these species alters in coming years.

The most common species, *Hypholoma fasciculare,* is, however, one with potential hazardous characteristics when eaten. Interestingly this species scored the highest recording frequency in BMS forays (Rayner 1979) and was also found to be the most common fungus found over a period of 10 years at Buckland Warren (Killick 1989).

When the full Haringey species list is compared to the 63 most common British species noted by Rayner (Rayner 1979) it is found that 42 of these 63 (67 per cent) have been recorded in the Borough. Such a correlation suggests that many of those species determined by Rayner as common to rural foray sites are also common in urban habitats and are not deleteriously affected by the urban environment.

3. Habitat range

A consideration of the species recorded at the selected sites in 1989, 1990 and 1991 allows a tentative comparison of habitats to be made. The totals of Aphyllophorales, Agaricales and Gasteromycetales for the three years are shown in Table 2.

The check-list for this investigation forms part of the general records in Appendix 1 as coded for the specific sites.

The most extensive comparison was performed in 1989 covering 11 sites, and summary totals of records are presented in Table 3.

Although variation exists between sites of the same type, some consistencies are evident if the sites are considered according to their habitat, in particular

TABLE 2. Species totals for Aphyllophorales, Agaricales and Gasteromycetales for specific surveys 1989, 1990 and 1991.

Habitat	**Key**	**Site**	**1989**	**1990**	**1991**	**Average**
Woods	W1	Queen's	19		15	
	W2	Coldfall	16	22		18.0 ±2.7
Parkland and wasteland	P&W1	Chestnut	1			
	G1	Crouch End	26			
	P&W3	Downhills	5	19	6	
	P&W2	Hollick	4			
	G2	Tottenham Marshes	11	20	13	11.7 ±8.0
Cemeteries	C2	Hornsey	7			
	C1	Tottenham	12	25	16	15.0 ±6.6
Railway	R1	Parkland Walk	12		17	
	R2	Parkland Walk Extension	14	16		14.8 ±1.9

TABLE 3. Species totals for Haringey sites visited in 1989.

Site	**W1**	**W2**	**G1**	**G2**	**P&W1**	**P&W2**	**P&W3**	**R1**	**R2**	**C1**	**C2**
Total	28	29	48	24	10	5	20	29	17	26	14
Unique to site*	3	4	7	1	2	0	2	2	6	4	3

* Unique to total yearly list.

TABLE 4. Species totals for Haringey sites visited in 1990.

Site	**W1**	**W2**	**G1**	**G2**	**P&W1**	**P&W2**	**P&W3**	**R1**	**R2**	**C1**	**C2**
Total	—	32	—	37	—	—	31	—	34	57	—
Unidentified	—	4	—	8	—	—	3	—	12	22	—
Unique to site	—	16	—	9	—	—	9	—	8	11	—

TABLE 5. Species totals for Haringey sites visited in 1991.

Site	**W1**	**W2**	**G1**	**G2**	**P&W1**	**P&W2**	**P&W3**	**R1**	**R2**	**C1**	**C2**
Total	26	—	—	14	—	—	8	23	—	21	—
Unidentified	9	—	—	1	—	—	2	4	—	5	—
Unique to site	15	—	—	7	—	—	4	15	—	14	—

the lower totals for park and wasteland compared to other habitats. Although woodland scored highly, the most productive site was the mixed grassland of Crouch End Playing Fields.

When the sites are assessed for the number of agaric and gasteromycete species not found on other sites, few unique species were found: the only notable specific localization being *Calvatia excipuliformis* on railway land. This low level of specific association indicates that no particular habitat has a propensity for specialised fungal growth.

These conclusions are upheld by similar comparisons of records from site surveys in 1990 and 1991 (Tables 4 and 5).

From the summary shown in Table 2 it is evident that woodland, cemeteries and railway sites recorded similar numbers of species.

Parkland and wasteland sites recorded lower totals which were more varied than totals for other sites. This could indicate that fungi on such exposed sites with less tree cover are more susceptible to climatic conditions, perhaps only appearing when weather conditions suit. More detailed studies covering a season in more detail would be of value in determining this possibility.

Differences in the variety and frequency of urban fungi have been reported for the town of Lodz in Poland and indicate that three distinct zones exist ranging from a sparcely populated inner central zone with 72 species through a more populated urban zone with 162 species to a suburban zone with 403 species (Lawrynowicz 1982). A possible correlation with the presence and health of trees, pollution and relative humidity was indicated. Little evidence is contained to support this result in Haringey, possibly because the Borough geography does not provide sites at significantly different distances from the city centre. The overall total of 243 species would place the sites in the mid-urban zone as proposed by Lawrynowicz. Similar studies of sites in adjacent boroughs would be of great value in assessing this prospect.

It is interesting, nevertheless, that *Marasmius oreades* was the most prevalent symbiont in the central zone in Lodz and was a predominant species in Haringey. Similarly a low proportion of Aphyllorales was found in both studies. Some specific physical characteristics were determined for the sites visited in Haringey to determine if correlations could be made with species numbers and distribution. These included area measurements, soil pH, soil moisture and soil organic content. The areas of Haringey sites was determined from map measurements. A positive correlation ($r = 0.43$) is found between the number of species recorded and the area of the site surveyed, but this is not significant ($p = 0.19$) suggesting that other features such as habitat composition affect diversity.

The soil characteristics of the sites visited in 1990 are summarised in Table 6.

TABLE 6. Soil features of sites surveyed in 1990.

Site	**PWE**	**DP**	**TM**	**TC**	**CW***
Soil moisture upper layer (%) (0-5cm)	3.08	4.39	2.91	4.34	5.04
lower layer (%) (5-10cm)	2.08	2.25	—	3.54	1.76
Soil organic content upper	6.37	7.08	4.27	4.37	17.78
lower	5.77	3.90	—	2.53	1.55
Soil pH upper layer	7.1	6.3	6.8	6.5	3.9
lower layer	6.4	5.9	—	6.3	4.3

* Key
PWE = Parkland Walk Extension
DP = Downhills Park
TM = Tottenham Marshes
TC = Tottenham Cemetery
CW = Coldfall Wood

Although these results are within a fairly narrow range it is evident that site 8 (Coldfall Wood) has a more variable moisture content and a very high organic content as might be expected from leaf-litter. The pH was also much lower in Coldfall Wood, while the Parkland Walk Extension was much higher, possibly reflecting the underlying substrate. Evidence has been presented for a correlation of fungal numbers with rainfall (Killick 1989) but in this study no correlation was observed between fungal numbers and soil moisture, organic content or pH.

Associations of fungi with tree species were not recorded but recent studies have indicated that significant numbers of fungi may be associated with non-native species (Roscoe and Frost 1992). Since many urban sites contain planted trees, opportunities for fungal association may be considerable and management of sites could be directed to enhance this. In this respect it is of interest that only one record (in 1991) has been made from the new wood planted on the Downhills Park site in 1987. Future visits will be of interest to determine the extent and pace of colonisation of this habitat.

4. Poisonous and edible species

Nineteen species were recorded with some degree of poisonous associations. These ranged from the deadly *Amanita phalloides* to species only affecting sensitive individuals, such as *Agaricus xanthodermus,* and others which may poison by gradual accumulation, such as *Paxillus involutus*. The full check-list of these species is as follows:

Major digestive irritants	*Russula fragilis* *Lactarius chrysorrheus* *Lactarius quietus* *Agaricus xanthodermus* *Hebeloma crustuliniforme* *Hypholoma sublateritium*	*Russula sororia* *Lactarius torminosus* *Lactarius necator* *Clitocybe nebularis* *Hypholoma fasciculare*
Cardiovascular syndrome	*Coprinus atramentarius*	
Hallucinogenic	*Psilocybe semilanceata*	
Muscarin syndrome	*Inocybe geophylla, Clitocybe dealbata*	
Myco-atropinian syndrome	*Amanita muscaria*	
Phalloidian syndrome	*Amanita phalloides*	
Gyromitrian syndrome	*Helvella crispa, Paxillus involutus*	

With this range of poisonous fungi present, the Borough is by no means safe for the unguarded fungus-eater and confusions could easily occur, for example with *Agaricus xanthodermus* and edible agaric species, or with *Clitocybe dealbata* and *Agaricus* species. Some of the above species would provide immediate indication of unpalatability, in particular hot *Russula* and *Lactarius* species. Others, however, would provide no warning and could be eaten with more serious and possibly ***lethal*** results.

Some species have specific features associated with their poisoning which may be more readily identifiable. *Coprinus atramentarius* poisoning normally develops when taken in conjunction with alcohol, producing flushed appearance and general irritation. *Psilocybe semilanceata* produces hallucinations as well as nausea in high doses. Occurrence of these species was spread through the Borough with 53 per cent being localised in woodland. *Amanita phalloides* was only recorded from Queen's Wood, but another deadly species, *Inocybe geophylla,* occurred in a variety of locations.

Fifteen notable edible species were recorded in the Borough in a variety of locations. Many other species would be digestible, but of little edible value or of unknown effect. The commonly eaten wood blewit *Lepista nuda* and oyster mushroom *Pleurotus ostreatus* were commonly seen over a period of years, while other species such as the birch boletus *Leccinum scabrum* only appeared intermittently. A range of edible *Agaricus* species was noted on various sites, but not always consistently.

Alexandra Palace was the most fertile site for edible species, but a number were noted from roadsides and wasteland. Such locations should make collectors wary about quality since fungi are known to accumulate heavy metals and could be highly polluted in urban areas.

To investigate this possibility samples of common edible fungi were collected in inert containers and later analysed for lead, cadmium and chromium. The results are shown in Table 7.

These results indicate that most samples were below the advisable limit of 1.0 microgram per gram fresh weight for lead and 0.05 micrograms per gram fresh weight for cadmium. However levels of lead and cadmium from fungi on Tottenham Marshes were high, as were lead levels in fungi from Coldfall Wood and from an urban roadside collection.

Surveys by the Ministry of Agriculture, Fisheries and Food have found high levels in some home-grown vegetables in urban areas, particularly of accumulator plants such as spinach (Moir and Thornton 1989). However, there could be a danger from eating large quantities of such fungi since the maximum weekly

TABLE 7. Heavy metal levels in fungus samples from 1990 survey sites. Values are μg metal per gram wet weight.

Fungi and site	**Lead**	**Chromium**	**Cadmium**
Coprinus comatus Tottenham Marshes	0.380	–	0.210
Marasmius oreades Tottenham Marshes	0.014	0.165	0.030
Agaricus campestris Tottenham Cemetery	0.190	–	0.030
Armillaria mellea Coldfall Wood	0.380	–	0.080
Macrolepiota procera Parkland Walk	0.060	–	0.060
Agaricus sp. Urban roadside	0.320	0.020	–

intake of lead (<180 μg) and cadmium (<140 μg) considered acceptable by the Ministry could be exceeded.

On the basis of results reported here, a large fungus of 25 grams could contain up to 10 milligrams of lead and 5 milligrams of cadmium. Regular consumption over a period of time could provide a substantial intake of contaminants, as could the indulgence of a single large meal of many fruit bodies.

As a result it would be prudent advice to refrain from extensive collection and ingestion of wild fungi in urban areas and particularly from wasteland and roadside sites. Sources of heavy metal pollution of urban vegetables has been suggested as coal ash (Davies 1978) and lead paint (Preer *et al.* 1980), and both of these would be likely contaminants in many urban habitats. Studies have also shown that heavy metal contamination varies with distance from roadsides and with soil depth, and that vehicle exhaust fumes are a significant source (Lagerwerff and Specht 1970).

More detailed work could usefully investigate the distribution of such heavy metals more exactly on different urban sites and also within the fungus samples to determine whether contamination was throughout the fungus tissue or as a surface accumulation. A comparison of transient and more persistent fruit bodies would also be of interest in this regard.

Acknowledgements

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APPENDIX 1

Site Locations and Descriptions

The Borough of Haringey lies 9 to 14 kilometres to the north of the City of London. It is 8 kilometres east to west and 5 kilometres north to south.

Although most of the Borough is based on London Clay there are some outcrops of chalky Boulder Clay and glacial gravels. The flora of many sites, however, is exposed to soils containing the effects of human development. Parklands are common and vary from original grassland as in Crouch End Playing Fields to land restored from industrial use as at Hollick Wood and from railway use as in the Parkland Walk.

Landfill has been practised at some sites such as Hollick Wood and Tottenham Marshes and may have considerable effects on the flora. A small amount of original woodland remains at Queen's Wood containing English oak *Quercus robur* and beech *Fagus sylvatica.*

Coldfall Wood (TQ277903)

This is a moderately sized wood containing a mixture of English oak, sessile oak *Quercus petraea* and hornbeam *Carpinus betulus.* A sparse undergrowth was evident during the surveying although coppicing may alter this. Ruderal species have been introduced at the edges of the wood, but overall it is relatively natural in its flora. Subsoil is London Clay with a large incursion of Boulder Clay and some glacial deposits in parts.

Crouch End Cemetery (TQ307893)

An established cemetery at the junction of two major roads. Although small, a range of introduced tree species is evident.

Crouch End Playing Fields (TQ293885)

An extensive area of parkland on the basis of playing fields and tennis courts and originally farmland. Trees are present in parts, but not predominantly. Subsoil is London Clay.

Chestnuts Recreation Ground (TQ325888)

A small local park with some peripheral lime *Tilia europaea* trees, football pitches and bowling green.

Downhills Park/Lordship Recreation Ground (TQ326901) (Figure 4)

An extensive parkland with sparse grassland cover over most aspects. Some established trees, particularly willows *Salix*, follow a small watercourse. A woodland was planted in 1987 in the western corner.

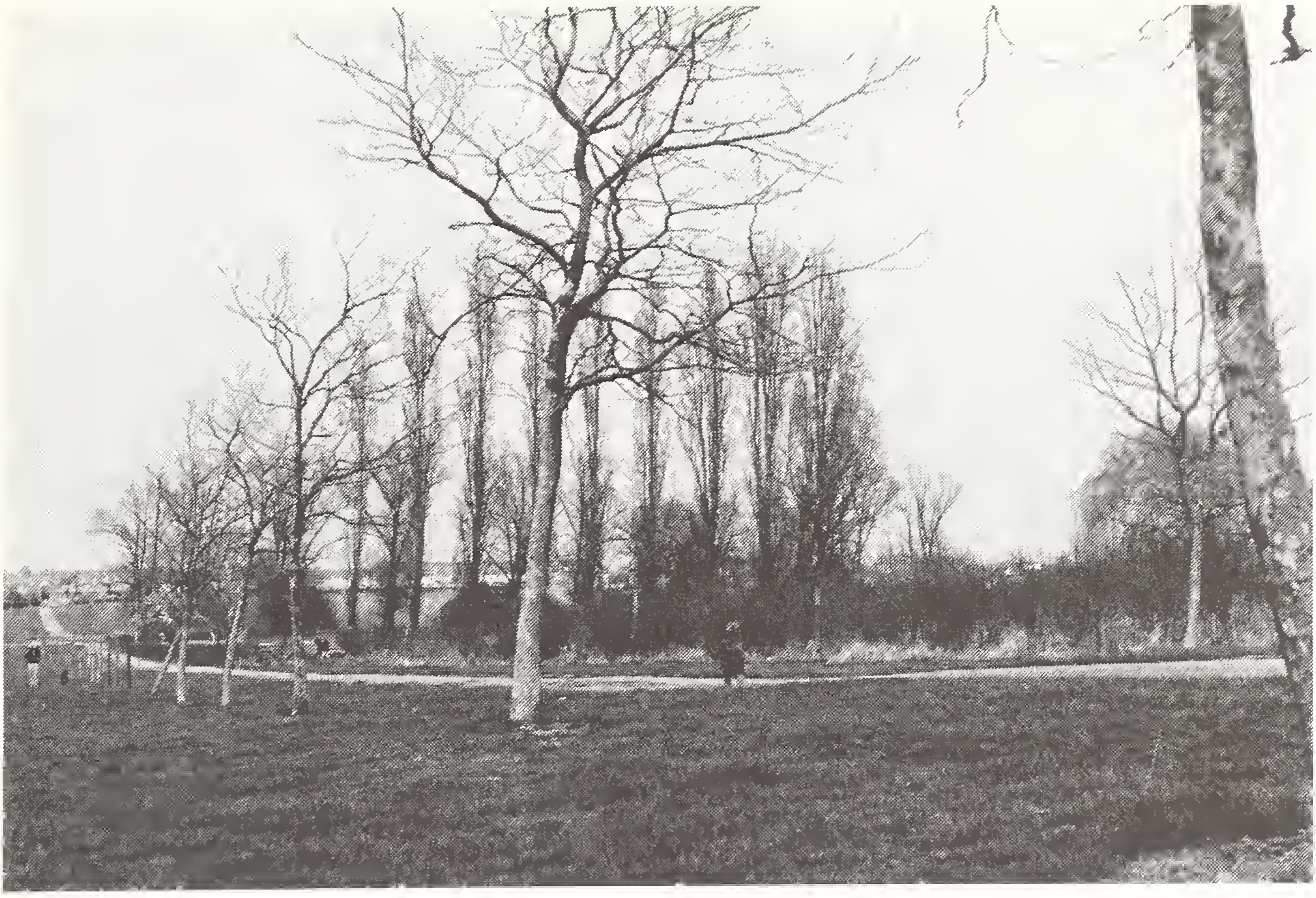

Fig. 4. Downhills Park/Lordship Recreation Ground, showing open parkland, poplar and willow trees and newly planted wood on right.

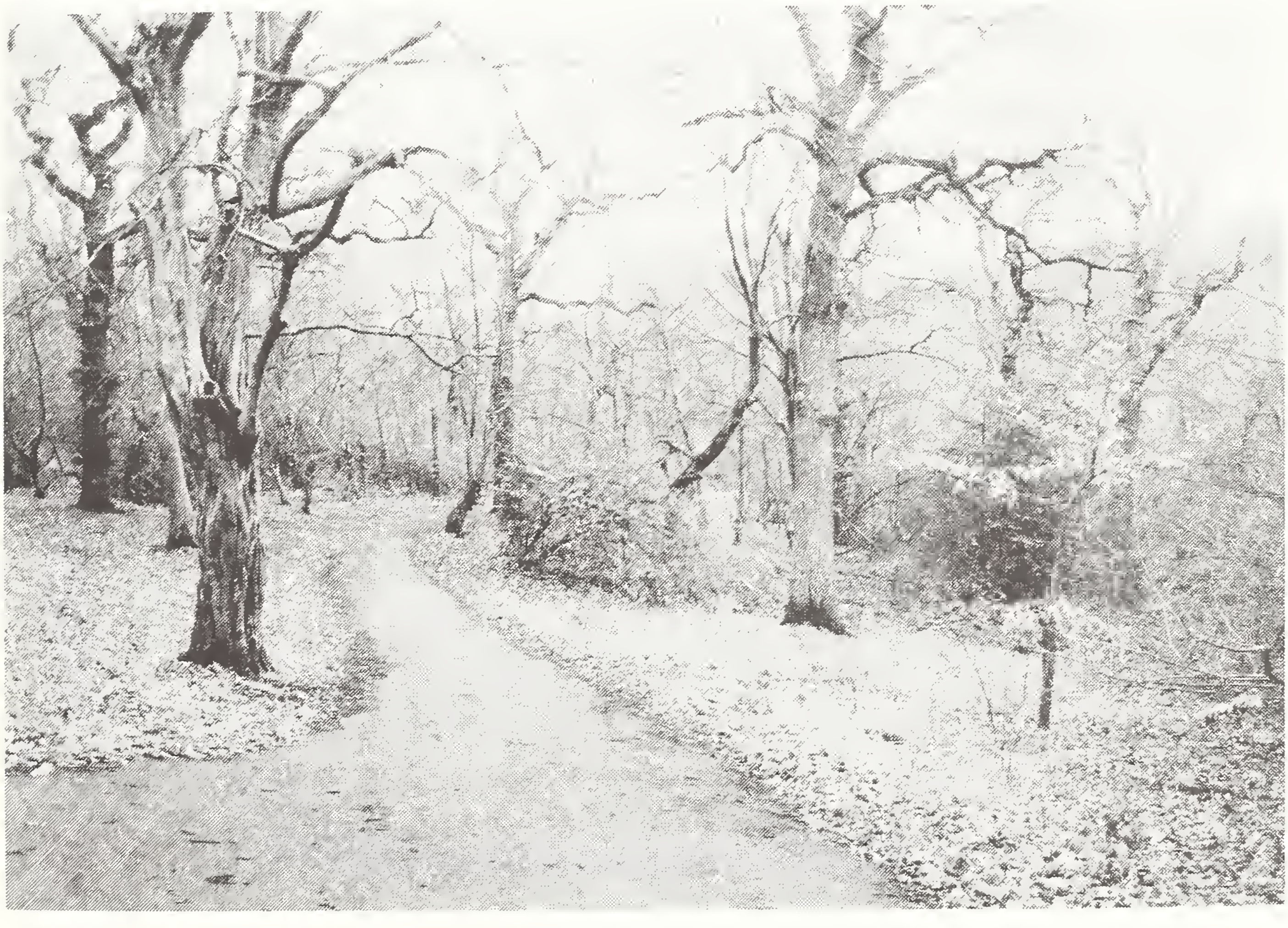

Fig. 5. Queen's Wood, showing mixed deciduous woodland and undergrowth.

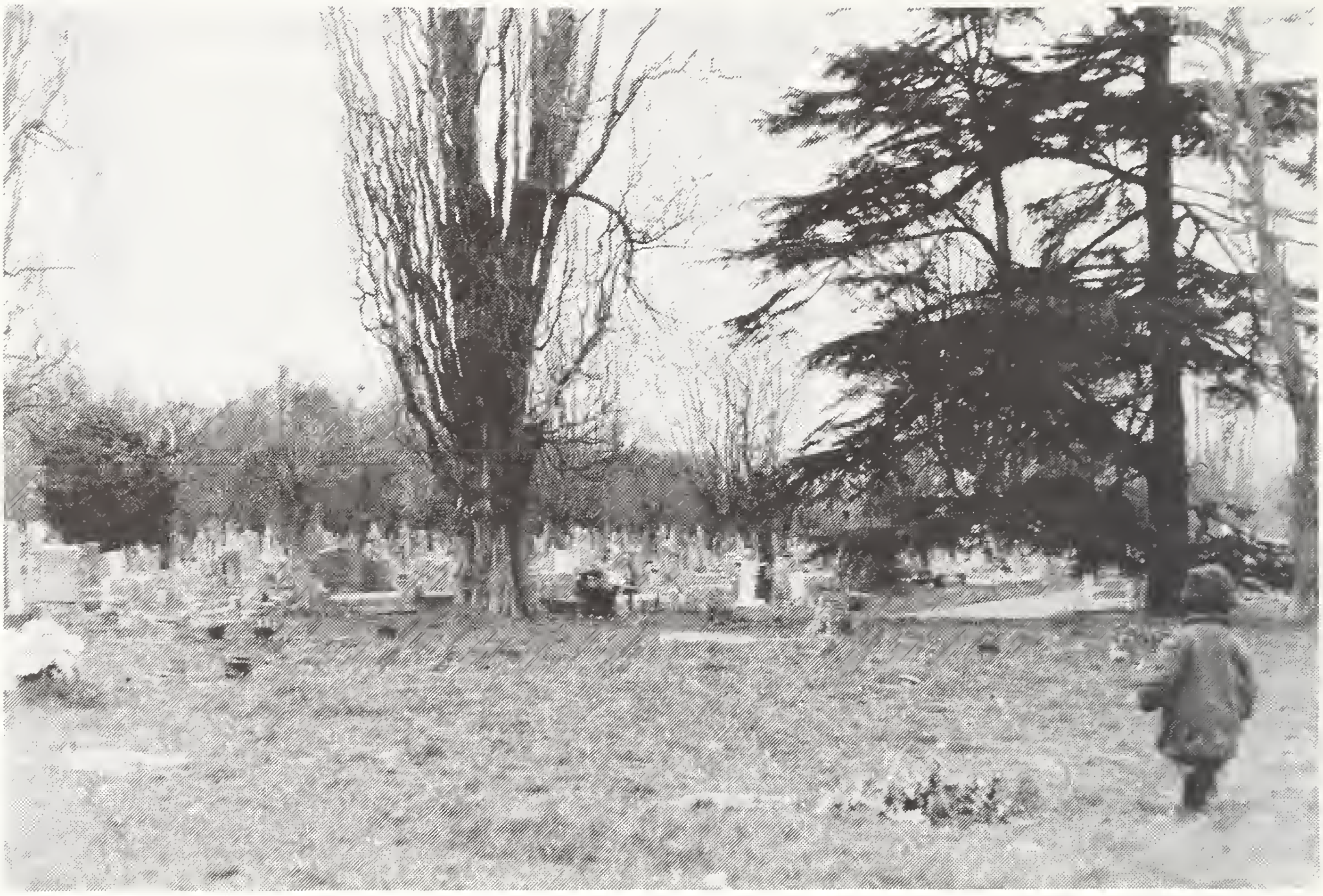

Fig. 6. Tottenham Cemetery, showing variety of trees and maintained grassland.

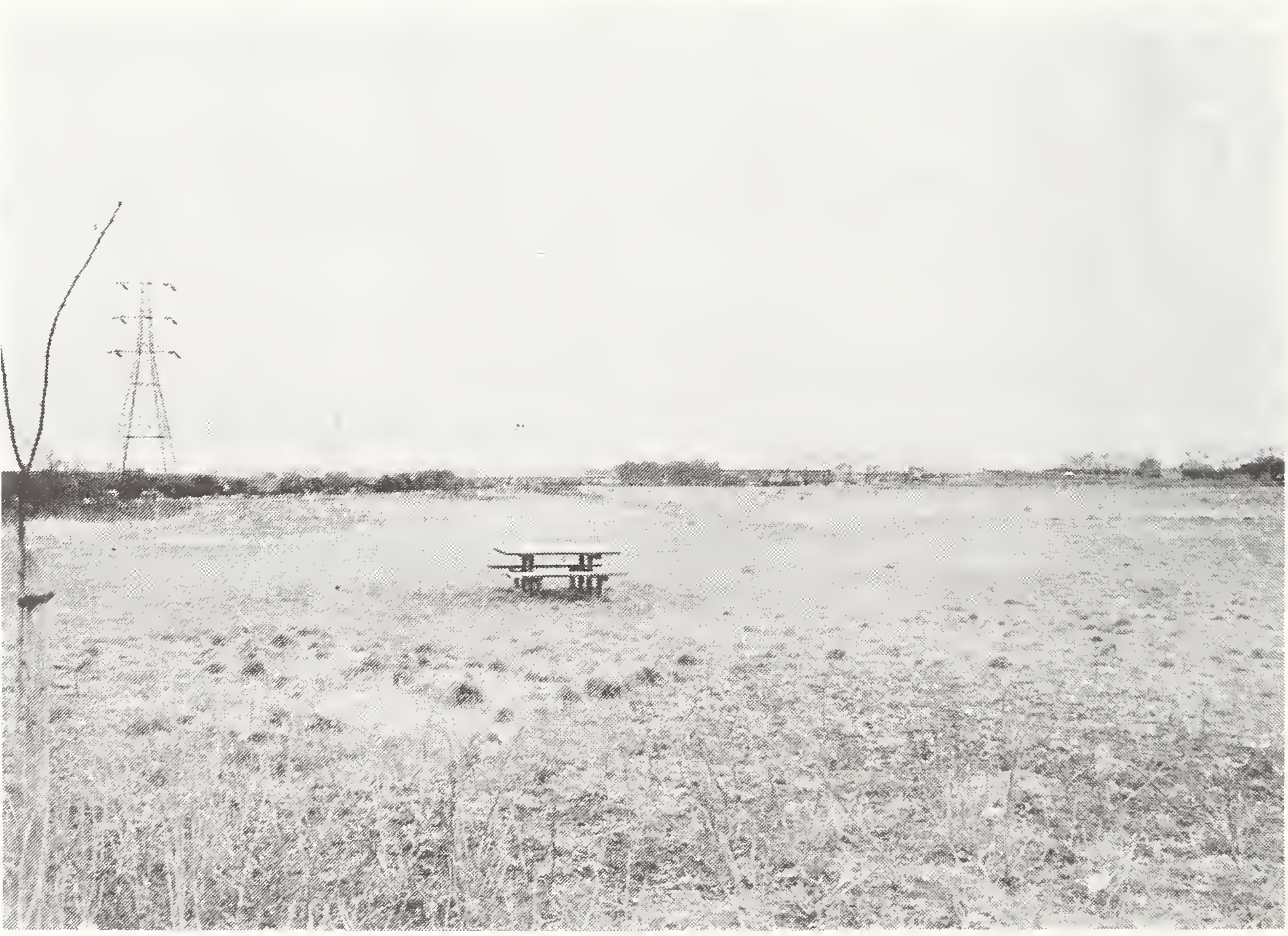

Fig. 7. Tottenham Marshes, showing open aspect with distant tree line.

Hollick Wood (TQ279913)

A barren wasteland of heavy tipping on top of a sewage works closed in the late 1960s.

Parkland Walk

A four-mile stretch of railway land running from Stapleton Hall Road to Alexandra Palace. Goods trains last ran in 1970 and the land was converted to an amenity walk in the 1970s. Tree cover is extensive in parts, but most stands are only 20 years old. Sycamore *Acer pseudoplatanus* predominates with birch *Betula*, willow and other pioneer species evident. A high proportion of the flora is introduced from gardens and by birds. Subsoil is London Clay and gravel.

Parkland Walk Extension (TQ314871)

A newly opened part of the Parkland Walk running adjacent to the main King's Cross East Coast Main Line railway tracks. Tree cover is limited, with birch and shrubs, whilst subsoil is railway ballast.

Queen's Wood (TQ287885) (Figure 5)

An extensive and original woodland surviving from before the settlement of the Borough. English oak and beech are predominant with hornbeam. Undergrowth is relatively rich and diverse and the subsoil is London Clay.

Tottenham Cemetery (TQ334911) (Figure 6)

A small seventeenth century cemetery with an extensive Victorian addition which is extensively managed. Introduced tree species are predominant and the underlying subsoil is London Clay.

Tottenham Marshes (TQ349905) (Figure 7)

An original marsh of the River Lea which was extensively tipped upon after the Second World War then capped with clay subsoil and left. The flora includes a wide range of aliens with a secondary habitat adjacent to the river. Subsoil is London Clay and gravel.

APPENDIX 2

Haringey Fungi Species List

General Key to Sites

A	Alexandra Palace	P	Parkland Walk
C	Coldfall Wood	Q	Queen's Wood
F	Finsbury Park	T	Tottenham Cemetery
H	Highgate Wood	V	Various locations

Key to Sites, 1989, 1990, 1991

1	Parkland Walk	7	Crouch End Playing Fields
2	Queen's Wood	8	Coldfall Wood
3	Hollick Wood	9	Hornsey Cemetery
4	Tottenham Cemetery	10	Downhills Park
5	Chestnut Recreation Ground	11	Tottenham Marshes
6	Parkland Walk Extension		

	1983	1984	1985	1986	1987	1988	1989	1990	1991
MYXOMYCETES									
Arcyria incarnata							C		
Comatricha nigra							8		
Enteridium olivaceum						H			
Lycogala epidendrum						H			
Physarum nutans							8		
Trichia persimilis							2		

	1983	1984	1985	1986	1987	1988	1989	1990	1991
ERYSIPHALES									
Erysiphe aquilegiae									
var. *ranunculi*									
(on *Ranunculus repens*)							4,10		
(on *Ranunculus acris*)							4		
Erysiphe artemesiae									
(on *Artemesia vulgaris*)							7,11	4,11	
(on Michaelmas daisy)								6	
Erysiphe asperifoliorum									
(on *Symphytum* sp.)							3,11		
Erysiphe cichoracearum									
(on golden rod)							1		
(on Michaelmas daisy)							3,5,10		
Erysiphe depressa									
(on *Arctium* sp.)							1		
Erysiphe heraclei									
(on *Anthryscus sylvestris*)							4,11	10	
(on *Heracleum sphondylium*)							1,3,11	10	
Erysiphe polygoni									
(on *Polygonum aviculare*)							5	4	
Erysiphe sordida									
(on *Plantago major*)							4,5,10	4	
Microsphaera alphitoides									
(on *Quercus* sp.)							1,7	8,10	
Microsphaera trifolii									
(on *Trifolium repens*)							6		
(on *Trifolium pratense*)								6	
Podosphaera clandestina									
(on *Crataegus* sp.)							2,10		
Sawadea bicornis									
(on *Acer pseudoplatanus*)							1,4	4	
Sphaerotheca fusca							3,4,5		
(on *Taraxacum*)							9,10,11	6,10	
Sphaerotheca plantaginis									
(on *Plantago lanceolata*)							3,4	4	
DISCOMYCETES									
Aleuria aurantia		Q							
Ascocoryne sarcoides						A			
Bulgaria inquinans						QH	C,2	8	
Chlorosplenium aeruginascens						QH			
Dasyscyphus niveus								11	
Helvella crispa					Q				
Orbilia xanthostigma							8		
Otidea alutacea						Q			
Peziza cerea							V		
Peziza echinospora						Q			
Peziza repanda	A				Q				
Poculum firmum							Q		
PYRENOMYCETES									
Creopus gelatinosus							1		
Daldinia concentrica	A			V	A	A	A		
Hypoxylon fragiforme						A			
Hypoxylon multiforme						C	8		
Nectria cinnabarina		P	V	V		AH	A,1,2,8,9	4,6,8	1
Xylaria hypoxylon				V	A	AQH	A,1	8	1,2
Xylaria polymorpha	A		V	V	A	A	A,1,7,9	4,11	2,4
UREDINALES									
Phragmidium bulbosum									
(on *Rubus* sp.)							3		
Puccinia coronata									
(on *Lolium perenne*)								11	

	1983	1984	1985	1986	1987	1988	1989	1990	1991
Puccinia hieracii									
(on *Taraxacum officinale*)								4.11	
Puccinia lagenophorae									
(on *Senecio squalidus*)							4		
(on *Senecio vulgaris*)							4.7	6.11	
Puccinia malvacearum									
(on *Malva sylvestris*)							4	11	
Puccinia punctiformis									
(on *Cirsium arvense*)								6.11	
AURICULARIALES									
Auricularia auricula-judae	A	P		V	A	A	A		
(on *Sambucus nigra*)							1.3	6	
Auricularia mesenterica	A	P	V	V		A	A,C.7		
Myxarium nucleatum						Q			
DACRYMYCETALES									
Calocera cornea						Q	1.2.8	8	
Calocera pallido-spathulata							1		
Dacrymyces stillatus	C	A					3.8	4.8	
Exidia glandulosa							8		
Exidia thuretiana							4		
APHYLLOPHORALES									
Bjerkandera adusta				V		QH	7	11	
Calyptella capula								11	
Clavulina cinerea					Q				
Chondrostereum purpureum							C.2.8	C.4.10	
Coltricia perennis								11	
Coriolus versicolor	Q	V	V	H	Q	AQH	C.1.2.7.8	8.10	2
Creolophus cirrhatus						A			
Daedalea quercina			V				3		
Daedaleopsis confragosa						AH	C	8	
Fistulina hepatica	AC				Q	H	A.7		
Ganoderma adspersum	A				A	AQ	A.3.4.9	10	
Grifola frondosa	H					H	2.3		
Inonotus hispidus							4		4
Laetiporus sulphureus						AH	A.2.8.9	10	
Meripilus giganteus		V			Q	A	4.9	4.10	4
Merulius tremellosus						H			
Mycoacia uda							1.4	8	
Oxyporus populinus		P							1
Peniophora lycii			V						
Peniophora quercina	A			V					
Phlebia merismoides		A					C	8	
Piptoporus betulinus	ACHV	A					2.8	8	1
Pleurotus cornucopiae	AV					A	A		
Pleurotus dryinus				H			A		
Pleurotus ostreatus	V			A	T	A	A		
Pleurotus pulmonarius					A				
Podoscypha multizonata		Q					A		
Polyporus squamosus	AV		V	V		A	A.1.4.7		1
Pseudotrametes gibbosa				V		A			
Rigidoporous ulmarius	A								
Schizopora paradoxa						A			
Stereum gausapatum		V							2
Stereum hirsutum					T	AQH	C.2.4.7.8	8.10	
Stereum ochraceo-flavum							C.2.7.8	8	
Stereum rugosum			V		T				2
Thelephora terrestris								6	
AGARICALES									
Agaricus arvensis					TV	A	F	4.6.11	4
Agaricus augustus									11

	1983	1984	1985	1986	1987	1988	1989	1990	1991
Agaricus bisporus		T							
Agaricus campestris		V					A,7,8,10,11	4,10,11	11
Agaricus langei								4	
Agaricus silvaticus					T				
Agaricus silvicola							A		
Agaricus xanthodermus		V			T			4	4
Agrocybe aegerita						A	V		
Amanita citrina		H							
Amanita fulva	H				Q				
Amanita muscaria		HQ			A		A		1
Amanita phalloides					Q	Q			
Amanita rubescens	CH	HQ							
Anellaria semiovata	V								
Armillaria bulbosa							9		
Armillaria mellea	C	AQV		H	T	AQ	A,9	8	
Armillaria polymyces	AC	A							
Bolbitius vitellinus						A	4,11	11	
Boletus erythropus	C								
Clitocybe dealbata							A,6,11	4	4
Clitocybe flaccida		Q						8	11
Clitocybe gibba	A	HQ				A			
Clitocybe nebularis		H			QT		1,2	8	2,1
Clitocybe rivulosa								4,11	
Clitopilus prunulus					A				1
Collybia butyracea		H			Q		6		
Collybia cirrhata								6	
Collybia cookei							6		
Collybia dryophila	T			V			1,2	8	2
Collybia marasmioides		Q					8		
Collybia fusipes	CH			V			8,9	8	
Collybia maculata									1
Conocybe pseudopilosella		P							
Coprinus atramentarius	AV		A		A	AQ	A,7,8		10
Coprinus comatus	AV				A	A	A,3	11	1,2,4,11
Coprinus disseminatus		V						4,10	
Coprinus hemerobius							1		
Coprinus lagopus	A	V				A			
Coprinus leiocephalus							7		
Coprinus micaceus	AV	A	V	V			A	4,10,11	4
Coprinus plicatilis		AV	T	A		Q	10,11	10,11	1,2,10
Cortinarius delibutus		V							
Cortinarius purpurascens		H							
Cortinarius subbalaustinus	A								
Flamulina velutipes	A				A		9		
Gymnopilus junonius						AH			
Gymnopilus penetrans					A	A	A		10
Gymnopilus spectabilis								8	
Hebeloma crustuliniforme						AHQ	A	4,6,8	1
Hebeloma sacchariolens									2
Hygrocybe nigrescens								6	
Hygrophoropsis aurantiaca						A	6	6,10	11
Hypholoma fasciculare	AV	AHQ	H	AQT	AQ		A,2,4,6,8	4,6,8,10	2,4,10
Hypholoma sublateritium					T				
Inocybe geophylla		V			Q	Q	2		
Inocybe geophylla var. *lilacina*						Q			
Kuehneromyces mutabilis						Q			
Laccaria amethystea	Q	HQ			Q	QH			
Laccaria laccata	H	Q			Q	AHQ			4
Lactarius chrysorrheus	C								
Lactarius necator						H			
Lactarius omphaliformis	H	H				AQ		8	
Lactarius quietus	H	H				Q			
Lactarius subdulcis		Q			Q				
Lactarius torminosus							A,6,7	6	1

	1983	1984	1985	1986	1987	1988	1989	1990	1991
Lactarius vietus	A	A							
Leccinum scabrum				V			6,7	6	
Lepiota acutesquamosa								4	
Lepiota cristata					Q	Q	A,2	11	
Lepista nuda		V			AQ	A	A,1,2,7,8	4	1,11
Lepista personata		H							1,11
Leucoagaricus pudicus								4,6,10,11	
Lyophyllum decastes		V					4,7,11	8	4,11
Macrolepiota procera	A					A	A		
Macrolepiota rhacodes					T	A	A	11	1,4
Marasmius oreades	AV	A	T		AT	A	V,4,5,7,8,11	4,11	1,4,11
Marasmius ramealis								10	11
Melanoleuca melaleuca							7		
Mycena aetites							8		
Mycena alcalina									2
Mycena amygdalina							6		
Mycena avenacea							7	4,10	
Mycena bulbosa							1		
Mycena chlorinella								10	
Mycena flavoalba								4	
Mycena galericulata						QH	A,2,4,8,11	8,10	
Mycena galopoda						Q		8	
Mycena haematopoda						H			
Mycena hiemalis							1,2		
Mycena ilicis									2
Mycena inclinata								8	
Mycena polygramma								10	
Mycena pura	C						V		
Mycena uracea								10	
Mycena vitilis							2,8		
Mycena vitrea							7		
Oudemansiella platyphylla		Q							
Oudemansiella radicata		Q							
Panaeolus foenisecii	C	A				A			
Panaeolus rickenii		T	T	V					
Paxilus involutus	CH	HPQ		V	A		A,6,7	6,8,10	1
Pholiota adiposa		Q							
Pholiota carbonaria						Q			
Pholiota oedipus									4
Pholiota squarrosa					V	A	10	10	10
Pluteus atricapillus		Q				AQ	A,2,7,10		11,10
Pluteus phlebophorus						A			
Psathyrella candolleana							8,11		
Psathyrella conopilea						A			
Psathyrella cotonea								11	
Psathyrella hydrophila					C	H	8	8	
Psathyrella lacrymaria							4		
Psathyrella marcescibilis		T							
Psathyrella micorhiza		V					A		
Psathyrella pennata		Q							
Psathyrella velutina		QV				Q	A,4	4,10,11	4,11
Psilocybe semilanceata		V			A	A	A		
Rickenella fibula							6,7	4,6	
Rickenella setipes									11
Russula atropurpurea	H	HQ							
Russula cyanoxantha	H				Q	AH	A		
Russula fragilis						A			
Russula nigricans	V								
Russula ochroleuca	CH	HQ			AQ	AQ			
Russula parazurea								4	
Russula rosea							A		
Russula sororia	H	Q							
Stropharia aeruginosa							A,7		4
Stropharia semiglobata	V								

	1983	1984	1985	1986	1987	1988	1989	1990	1991
Stropharia squamosa						H			
Tricholomopsis rutilans	C								
Tricholoma cingulatum						A		6	
Tricholoma saponaceum								10	
Tricholoma scalpturatum						Q			
Tubaria furfuracea							10	10,11	
Volvariella speciosa		H							
Xerocomus badius	C	Q			Q				
Xerocomus chrysenteron		HQ		V	T	H	A	4	
Xerocomus pruinatus								4	
Xerocomus subtomentosus							A,1	4	
GASTEROMYCETALES									
Bovista nigrescens		Q							
Bovista plumbea						A	7,11	11	4
Calvatia excipuliformis							6	6	1
Geastrum striatum					A	A	A		
Lycoperdon foetidum		T				A			2
Lycoperdon perlatum	AV				AQ		6,7	6	
Lycoperdon pyriforme		AH		V	A	AH	A	4	
Scleroderma areolatum				H					2
Scleroderma citrinum				V	Q	H	1,2,7		2
Scleroderma verrucosum							1,4,7		
Vascellum pratense							11	4,11	
FUNGI IMPERFECTI									
Spedonium chrysospermum (on *Paxillus involutus*)							6		

Book Review

Primates of the World. By Rod and Ken Preston-Mafham. Blandford Press, London. 1992. 191 pp. £14.99. Many illustrations in colour and black and white. ISBN 0-7137-2171-5.

After being conditioned by television programmes to the enormous abundance and diversity of life in tropical forests, a visitor, especially on a short holiday, can be very frustrated by the sheer difficulty of seeing any kind of animal life amongst the exuberance of vegetation. However with patience one or two species of monkeys can be found in most tropical forests and watching them can be both challenging and rewarding. In more open habitats, as in the savannahs of Africa or the dry forests of India, a few species are conspicuous and easily observed while at the opposite extreme some primates, notably the lemurs, bushbabies and tarsiers, are as nocturnal and elusive as most other groups of smaller mammals.

The literature on primates is voluminous, but the huge amount of field research now being conducted means that even good, popular accounts quickly become out of date and many are badly dated before they appear. Although Rod and Ken Preston-Mafham are better known for their books on invertebrates, this volume has been carefully researched, including findings from many recent published studies as well as first-hand experience. A review of the diversity of primate species is followed by chapters on topics such as reproduction, behaviour, food and ecology, all very readable and providing intriguing insights into many aspects of interest to the field naturalist. Unfortunately it does not include any references that would allow the reader to explore particular topics in more detail.

The book is copiously illustrated with colour photographs of high quality, many taken in the wild, others in zoos, but with the source always explicit. It is not intended to be a field guide, but field guides including primates are available for many parts of the world in which they occur. This volume can be highly recommended as a very readable and illuminating review.

G. B. Corbet

A Study of Corticolous Lichens on London Plane *Platanus* × *hybrida* Trees in West Ham Park, London

By S. Boreham*

Abstract

Falling sulphur dioxide levels in London during the last 25 years have produced more favourable conditions for lichen growth. Other workers have surveyed the recovery of corticolous lichens in north and west London in response to this change. In this study lichens epiphytic on London plane trees in West Ham Park have been investigated and related to declining aerial sulphur dioxide pollution. This has provided a baseline study of the corticolous flora of the London plane and a record of lichen recolonization in east London. The *Xanthorion* was found to be colonizing tree bases and the *Physodion*, bark higher up the trees.

Introduction

Air pollution in London has been recorded since the thirteenth century. Laundon (1967, 1970) and Sandford (1979) give a historical perspective to London's air quality problems. In December 1952 soot and sulphur dioxide from the city were trapped by a temperature inversion creating a highly acidic 'smog'. The Clean Air Act of 1956 attempted to prevent such phenomena by reducing particulate emissions through the creation of 'smokeless zones'. However, the increased use of sulphur-rich fuel oil caused concentrations of sulphur dioxide in central London to rise by 80 per cent between 1952 and 1962 (Laundon 1967). Following the introduction of North Sea gas there was a rapid decline in aerial sulphur dioxide in central London. Mean winter levels dropped from more than 250 μgm^{-3} in 1962 to 130 μgm^{-3} in 1978 (Sandford 1979, Rose and Hawksworth 1981). A further reduction to below 50 μgm^{-3} had occurred by 1983 (Laxen and Schwar 1985), and, with the closure of the Thames-side power stations, this level of sulphur dioxide pollution prevailed in central London throughout the 1980s (Hawksworth and McManus 1989). However, occasional transient peaks of up to 1000 μgm^{-3} were still recorded throughout this period (Pearce 1987).

A similar pattern of falling sulphur dioxide levels is known from north and west London where recolonization by corticolous lichens has been observed on a variety of tree species (Rose and Hawksworth 1981, Hawksworth and McManus 1989). However, little is known of lichen recolonization in east London. Amongst the many interacting environmental parameters affecting recolonization, bark pH, which varies between tree species, is thought to influence most strongly the epiphytic flora (Barkman 1958, James *et al.* 1977). It would therefore be desirable to study the changing corticolous flora of one tree species throughout the London area. However mature native trees are relatively scarce in the Capital, but the London plane *Platanus* × *hybrida*, introduced from 1750 (Webster 1920), has been widely planted in streets, squares and parks, and has become the City's commonest tree.

The London plane is noted for its resistance to air pollution and for the ornamental nature of its exfoliating bark, which gives the tree bole an attractive mottled appearance. It is possible that this has discouraged work on the corticolous flora, although some observations have been made by Earland-Bennett (1989) and Hawksworth and McManus (1989). Annual increments of periderm form a layer of dead outer bark which begins to separate at the junction of thin-walled and thick-walled cork layers as the trunk diameter increases (Sporne 1974, Esau 1965). Eventually the old outer bark is shed to reveal the thick-walled cork as a new smooth surface available for colonization by epiphytes. Preliminary investigations herein suggest that on a mature bole up to 50 per cent of bark is older than 3 years, some patches are at least 10 years old and that between 10 per cent and 20 per cent of the bark surface has been recently exposed. This profoundly affects epiphyte colonization, with the algal *Desmococcus* community on younger bark being replaced by crustose, foliose and fruticose lichens at certain heights and aspects with time. The lichen flora of a London plane tree is therefore in a dynamic state as a consequence of secondary thickening of the trunk. Falling aerial sulphur dioxide pollution could cause rapid changes in the corticolous lichen flora of these trees across the London area. In this study the corticolous lichen flora of London plane trees growing in West Ham Park has been investigated. It is intended as a baseline study of the corticolous flora of London plane, and as a record of lichen recolonization in east London.

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Methods and Materials

Site description

West Ham Park (National Grid reference TQ401842) comprises 0.25 km^2 of open land some 10 km east of Charing Cross in central London. Originally the grounds of Ham House, the Park was acquired by the Corporation of London in 1874, and has since been managed as open public grounds and gardens. The Park has a mown grass sward with numerous pathways lined by avenues of mature London plane trees. Some trees have also been planted between avenues so that the centre of the Park resembles open woodland. A mainly residential urban sprawl extends to the north and east, and industrial areas are within 3 km to the south and west.

Investigation of bark age

Samples of London plane bark 2 mm × 2 mm were cut from mature trees with a range of bark thicknesses for thin sectioning. These were fixed under vacuum in ethanol, and processed with absolute alcohol, a histological clearing agent, and paraffin wax. The samples were embedded in paraffin wax, and 18 μm-thick sections were cut with a rotary microtome. Annual increments of thick-and thin-walled cork cells were counted using a Leitz microscope with × 10 oculars and ×10 objectives. These data were used to estimate the relative abundance of bark age in the field.

Determination of bark pH

Samples of bark estimated to be greater than three years old were taken for pH determination from the southern aspect of 10 tree boles at 85 cm. Field observation confirmed the existence of the 'dog-zone' of Hawksworth and McManus (1989) at the base of each tree. Although not investigated, the 'event' wetting and eutrophication would be expected to effect both the pH and the suitability of the bark for lichen colonization. The surface 2 mm of bark from each sample was separated, and 1.0 g of this ground and soaked in 10 ml of de-ionised water for 24 hours in a stoppered container (Watson *et al.* 1988). The liquid was then filtered and the pH determined using a KM 7000 meter and a Corning Series 500 electrode.

Survey and analysis

Between May and August 1988, a total of 114 trees representing about 25 per cent of the London planes in West Ham Park were surveyed. Only undamaged trees with vertical trunks away from buildings and other sources of artificial shade were included. The girth of each tree was measured, and a quadrat 30 × 30 cm was centred at heights of 15 cm and 85 cm on the north, east, south and west aspects of each bole. In each of the eight positions, the percentage cover of crustose lichens and of the *Desmococcus* community, and the frequency and diameter of foliose and fruticose lichen thalli were recorded using the nomeclature of Dobson (1981). Tree girths ranged from 80 to 319 cm and six size classes were established. The mean percentage cover for the *Desmococcus* community, and the crustose lichens *Lecanora conizaeoides* and *L. dispersa* was calculated for each height, aspect and girth size class. The total frequency and thallus diameter of foliose and fruticose lichens were calculated for each height and aspect.

Results and Discussion

Bark age

The thickness of outer bark in the samples collected ranged from 0.2 mm to >5 mm. In recently exposed bark, the surface was smooth and only a band of thick-walled cork cells was seen outside the cork cambium. Bark 2 mm thick had between three and four annual increments with some exfoliation, and at 3.5 mm (five to six years) patches of remaining bark were rough surfaced and in the form of raised 'shields' often only attached to the trunk at three or four places. Growth increments of bark in excess of 5 mm thick proved difficult to count although an age of at least 10 years is suggested. Such samples were from concavities and recessed areas on the boles. It appears that on a mature bole between 10 per cent and 20 per cent of the bark has been recently exposed and that 50 per cent may be older than three years.

Bark pH

The mean pH calculated from the average H^+ ion concentation from 10 samples of ground bark was 5.71. Farmer *et al.* (1990) found that ground bark gave a lower figure for H^+ ion activity (and therefore a higher pH) than methods measuring the surface pH of bark both *in situ* and from waxed samples. It was considered that ground bark pH was adequate for use in studies of air pollution. These data suggest that bark of the London plane is slightly acidic and falls within the subneutrophilous category of Barkman (1958).

Sulphur dioxide data

The mean monthly sulphur dioxide levels recorded at two sites near West Ham Park between 1981 and 1987 are shown in Figure 1 (J. Land and J. Gardner, London Borough of Newham, pers. comms.). Newham 1 (N1) was situated 2.75 km south of West Ham Park at Hallsville Road, London E16

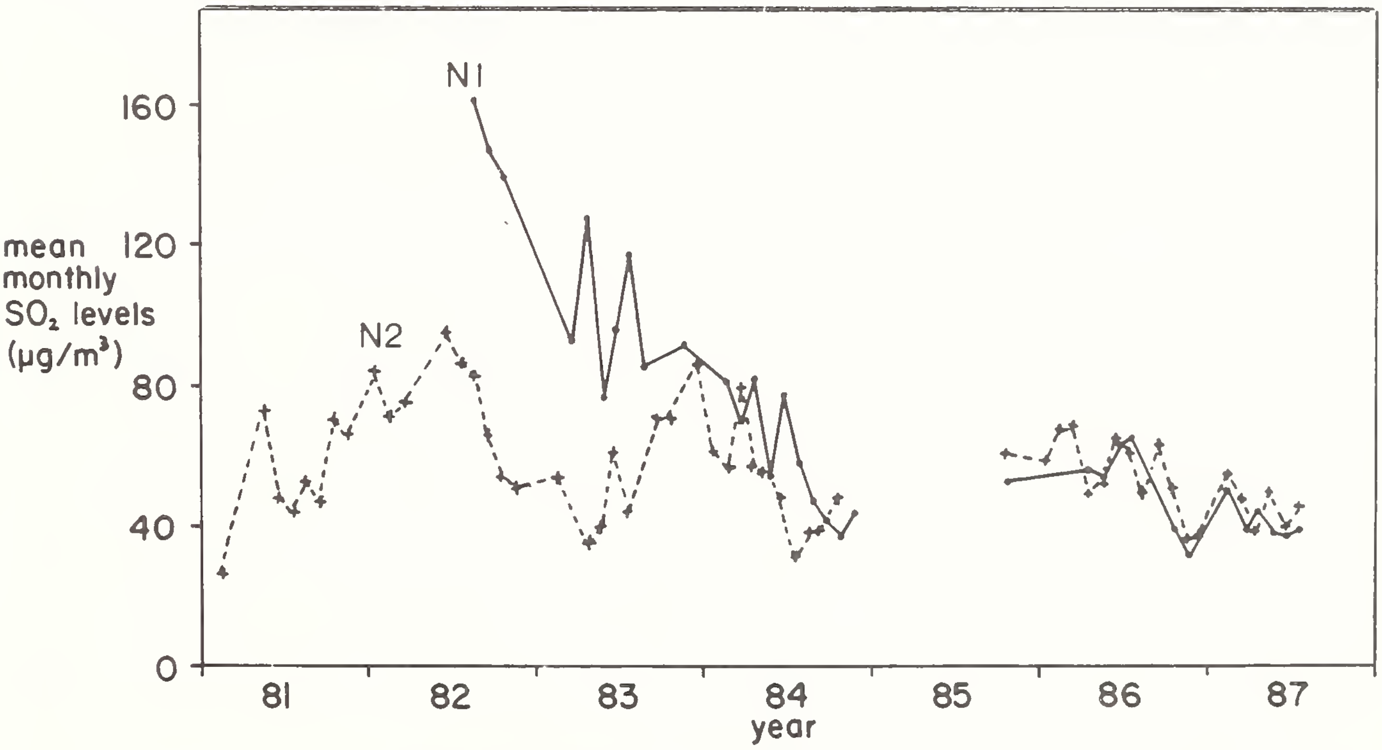

FIG. 1. Mean monthly sulphur dioxide levels recorded at two monitoring stations (N1 and N2) near West Ham Park, between 1981 and 1987.

(TQ396813), while Newham 2 (N2) was 1 km west of the Park in High Street, Stratford, London E15 (TQ388842). In the prevailing south-westerly winds Site N2 might be expected most closely to reflect sulphur dioxide levels at West Ham Park. For the period 1982-3 mean monthly sulphur dioxide levels at site N1 were between 70 and 160 μgm^{-3}, and almost twice those at site N2. It seems likely that these differences may be explained by the operation of a local industrial source until early 1984. By autumn 1984, monthly mean sulphur dioxide at both sites had declined to between 30 and 60 μgm^{-3}. Although few data are available for 1985, similar levels continued throughout 1986 and 1987, and in 1987-8 the mean winter sulphur dioxide levels at sites N1 and N2 were 40 μgm^{-3} and 45 μgm^{-3} respectively. It appears that following somewhat higher sulphur dioxide levels in the early 1980s, a period of less extreme conditions prevailed in West Ham Park for at least four years before this study.

Tree girth and age

The severe storm in October 1987 felled several mature London planes. By counting the growth rings exposed in cut sections of the boles, a relationship between girth and age was calculated. As a rough guide, a tree of 200 cm girth is about 100 years old, and a 300 cm tree is about 200 years old. More than 35 per cent of trees were in the class 160 to 199 cm indicating extensive planting during the mid-1880s, just after the Park was acquired by the City of London. There were some older specimens and a number of younger trees which had been replanted.

The *Desmococcus* community and abundant crustose lichens

The mean percentage cover of the algal *Desmococcus* community, and the crustose lichens *Lecanora conizaeoides* and *L. dispersa*, is shown for each height, aspect and tree girth size class in Figure 2. The *Desmococcus* community dominated the flora in a northern aspect, especially at 85 cm where it commonly covered over 50 per cent of the bark area. Younger trees had less algal cover, and the least favourable aspects were south and east. In contrast *L. conizaeoides* and *L. dispersa* were most abundant to the south and west. At 15 cm there was up to 15 per cent cover of *L. dispersa* and occasional *L. conizaeoides*, while at 85 cm *L. conizaeoides* reached a maximum of about 20 per cent cover and *L. dispersa* was not recorded. It appears that the 'event wetting' and eutrophication of the 'dog-zone' at the base of each tree (Hawksworth and McManus 1989) favoured *L. dispersa* at the expense of *L. conizaeoides*, and allowed lush growth of the *Desmococcus* community on some north-facing boles. The abundance of these epiphytes confirms the elevated aerial sulphur dioxide levels of the recent past.

Common foliose lichens

Figure 3 shows the frequency and diameter of *Parmelia sulcata* and *Hypogymnia physodes* thalli at each height and aspect. Both lichens were most abundant at 85 cm in a westerly aspect, where the best combination of illumination, moisture, bark pH and nutrient status occurred. Exposure to pollutants carried on the prevailing south-west wind had apparently few adverse effects. Presumably colonization at less favourable heights and aspects occurred at locations on the bole where conditions were somewhat ameliorated. Although several thalli of *P. sulcata* were between 15 and 20 mm in diameter, the majority were only 3-4 mm. Most thalli of *H. physodes* were 2-4 mm diameter and the largest were up to 14 mm. Although *Parmelia subaurifera* has been recorded in north and west London, it was not observed during this study. Rose and Hawksworth (1981) produced calibration curves for the diameter of *P. sulcata* and *H. physodes* thalli growing in north-west London, against minimum age. Based on these estimates for both species, it appears that the large numbers of young thalli observed were three to four years old, and that the largest were about seven years old. It is known that sulphur dioxide in

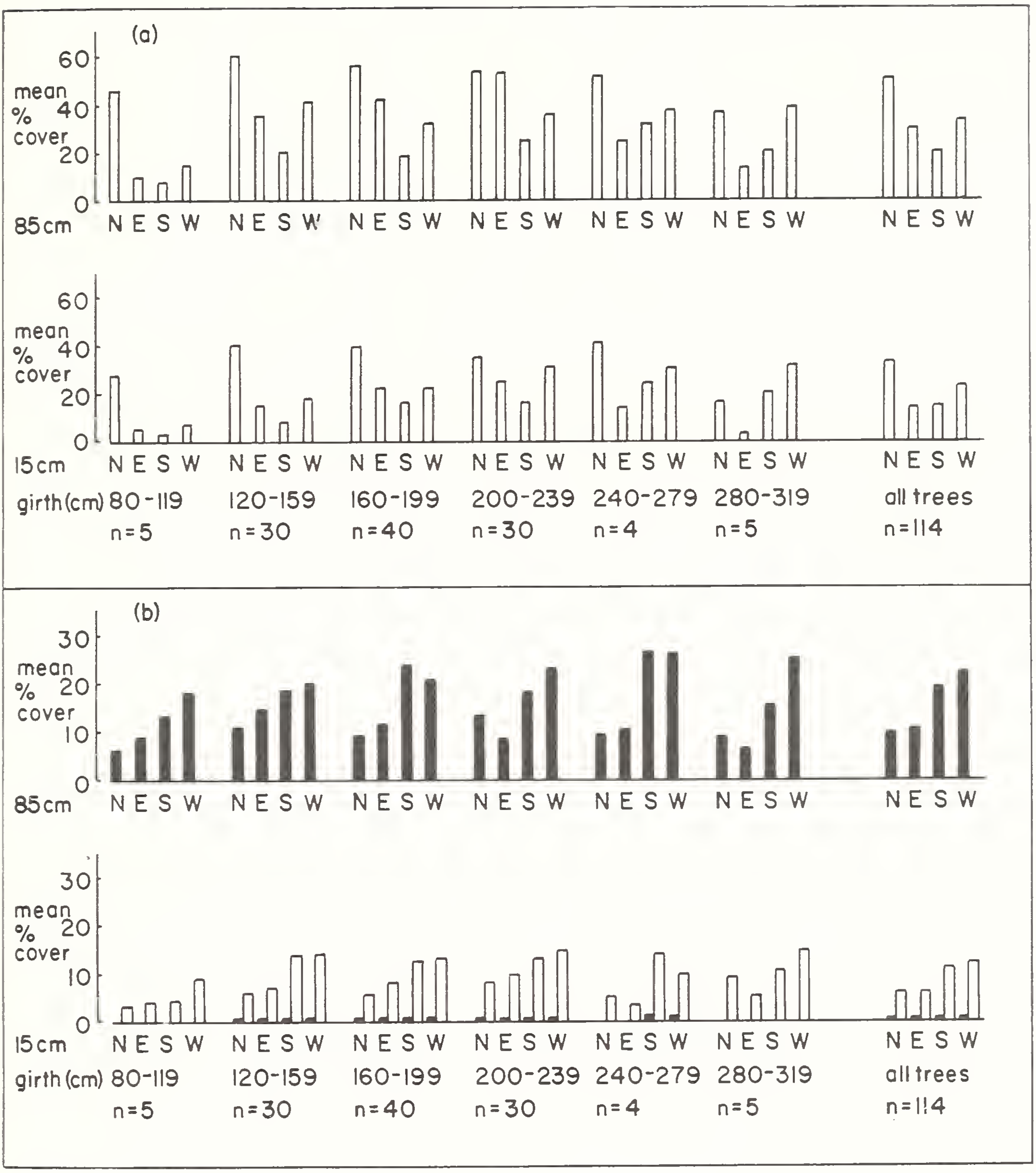

FIG. 2. Mean percentage cover of the *Desmococcus* community (a) and of *Lecanora conizaeoides* (■) and *L. dispersa* (□) (b) for each height, aspect and tree girth size class.

central London declined from 130 μgm^{-3} in 1978 (Sandford 1979, Rose and Hawksworth 1981) to below 50 μgm^{-3} in 1983 (Laxen and Schwar 1985). It is likely this allowed *P. sulcata* and *H. physodes* to become established on favourable sites by 1981. Both species had been previously recorded in adjacent 10-km squares at this time (Institute of Terrestrial Ecology 1982). However, significant colonization did not begin until 1984 when mean monthly sulphur dioxide levels fell below 60 μgm^{-3}. This apparently rapid response to falling aerial pollution suggests the continuous influx of propagules from populations of both species in less-polluted areas. It might be argued that the distribution of thallus size observed is merely an artifact produced by the exfoliation of bark. While the frequency of larger thalli might be reduced by this effect, the presence of at least 10-year-old bark, and the large numbers of young thalli seem to refute this.

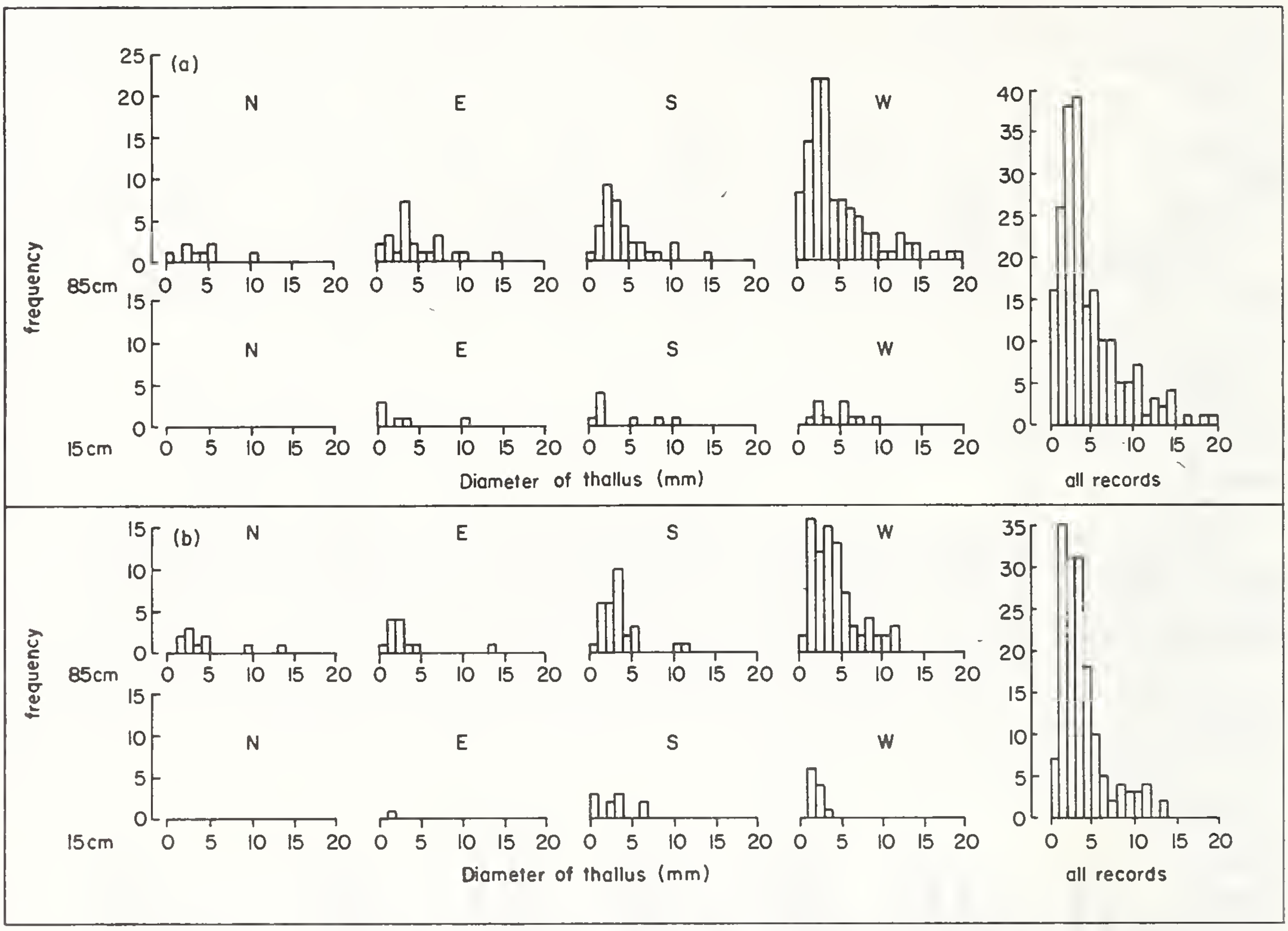

FIG. 3. Frequency and diameter of *Parmelia sulcata* (a), and *Hypogymnia physodes* (b), thalli at each height and aspect.

Other lichens

Figure 4 shows all records for the frequency and length/diameter of *Evernia prunastri*, cf. *Parmeliopsis ambigua*, *Xanthoria parietina* and *Ramalina farinacea* thalli. The occurrence of infrequent taxa is shown in Table 1. Thalli of *E. prunastri* were most common in a westerly aspect at 85 cm, and although some were in excess of 10 mm, most were 3-4 mm long. Almost all the rosette-shaped yellow-grey thalli identified as *Parmeliopsis ambigua* had diameters of 4 mm or less, and were largely from a western aspect at 15 cm. These had narrow flat palmate lobes, and the largest (8.5 mm across) had patches of powdery soralia. However, since discriminative chemical tests were not applied, the possibility of confusion between young thalli of this species and *Parmelia caperata* has been considered. In north-west London *P. ambigua* has recolonized very little compared to *Parmelia caperata*. The former is thought to prefer acidified bark, and while the pH of London plane bark seems too high to offer *P. ambigua* ideal conditions, the eutrophic 'dog-zone' seems an equally unlikely setting for *Parmelia caperata*. The *Atlas of Lichens of the British Isles* (Institute of Terrestrial Ecology 1982) shows *P. ambigua* recorded from four 10-km squares within a 20-km radius of West Ham Park and from 10 within 30 km to the north and south. In contrast *Parmelia caperata* was present in only two 10-km squares within a 20-km radius, and six within 30 km to the south. This provides evidence that *P. ambigua* had made more progress towards east London than *Parmelia caperata* prior to 1981. In addition, Hawksworth and McManus (1989) did not find *Parmelia caperata* at distances <10 km north and west of Charing Cross, and since West Ham Park is at this distance to the east, it might be concluded that *Parmelia caperata* would have been at the extreme limits of its range at the time of this study.

Although not numerous, *Xanthoria parietina* occurred to the south and west at 15 cm and exhibited a wide size range with examples up to 23 mm diameter.

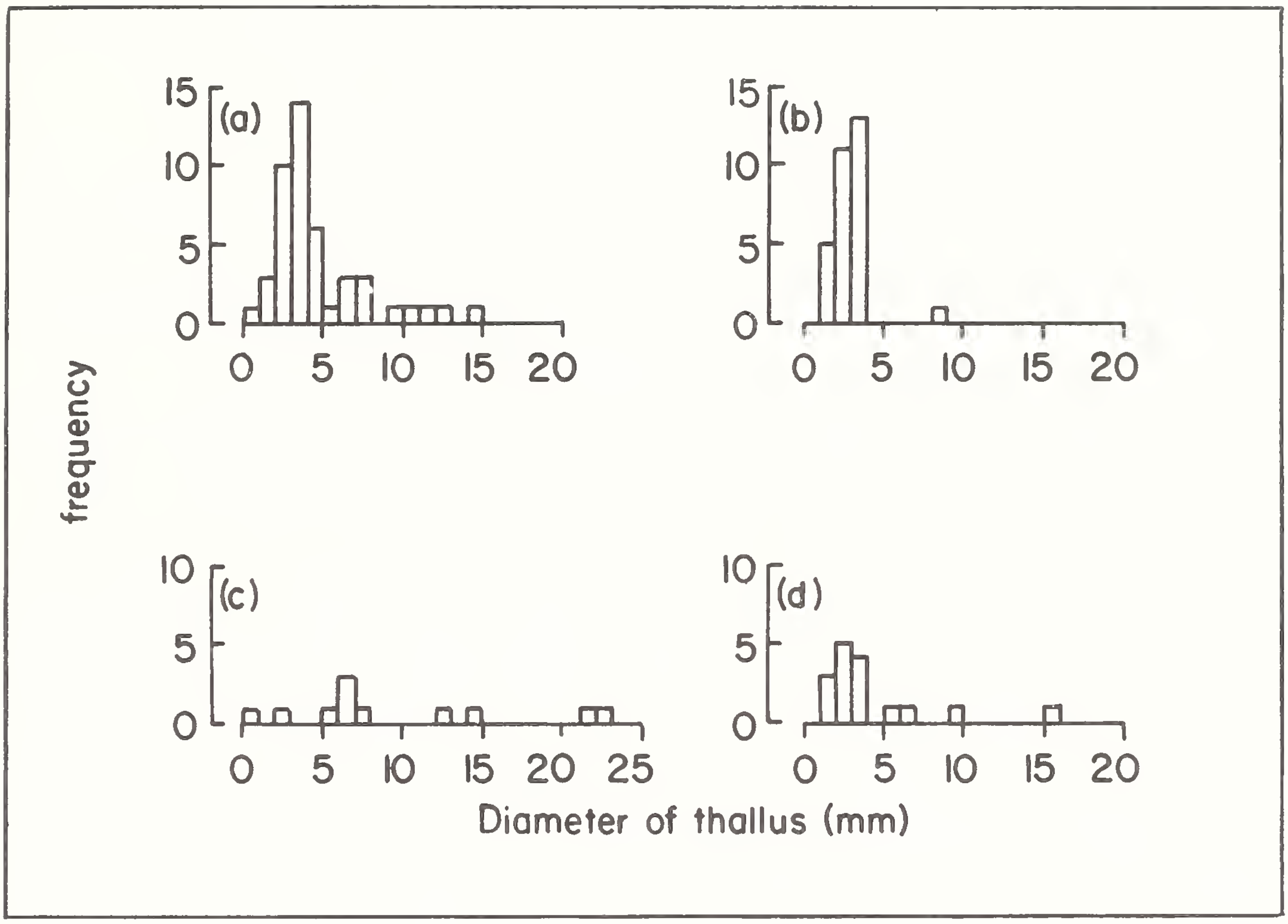

FIG. 4. Frequency and diameter/length of *Evernia prunastri* (a), cf. *Parmeliopsis ambigua** (b), *Xanthoria parietina* (c), and *Ramalina farinacea* (d), thalli.
*Tentative identification, see text.

TABLE 1. The occurrence of infrequent lichen taxa on London plane trees in West Ham Park. The size (mm), or percentage cover, and aspect of each thallus is shown. The number of trees bearing thalli of each taxon is also indicated. The total number of trees surveyed was 114.

Taxon	**Height**	**No. Trees**	**No. Thalli**	**Aspect** N	E	S	W
Buellia punctata	15 cm	2	5		3,3		12,12,12
Physcia adscendens	15 cm	3	11			4	6,6,6,5,4, 4,4,3,3,2
Ramalina farinacea	15 cm	1	1				4
	85 cm	5	6		3		3,4,2,2,3
Xanthoria parietina	15 cm	8	10			23,22,15 13,7,7	8,6,3,1
Evernia prunastri	15 cm	6	6		3	4,4,4, 3	4
	85 cm	12	13		4,4,3	2,1	10,5,5,5, 4,4,3,2
cf. *Parmeliopsis ambigua*[a]	15 cm	10	20	3	4,4,3, 3,2	3,3,3	9,4,4,4,4, 4,4,3,3,3,2
	85 cm	3	4	2	3,2		3
Lecanora expallens	15 cm	3	3				9%,5%, 1%
Lepraria incana[b]	15 cm	2	2	4%	1%		
	85 cm	3	3		1%	3%	1%

[a] Tentative identification, see text.
[b] Treated as the aggregate species.

Most records of *Ramalina farinacea* were from the west at 85 cm, and the majority of thalli were only 2-4 mm long. In addition *Buellia punctata, Physcia adscendens* and *Lecanora expallens* were found mostly in a western aspect and exclusively at 15 cm. Only the cosmopolitan *Lepraria incana* appeared to show little preference for aspect or height. The size distributions of *Evernia prunastri*, *Parmeliopsis ambigua* and *R. farinacea* were all similar with a few large and many small thalli. As with *Parmelia sulcata* and *Hypogymnia physodes* there is some evidence that these members of the *Physodion* (James *et al.* 1977) had an initial colonization phase on favourable sites, followed by more widespread establishment. This has resulted in the zone skipping described by Hawksworth and McManus (1989); in this case from Zone 1 to Zone 5 of Hawksworth and Rose (1970). In contrast *X. parietina* showed no such distribution, although most other members of the *Xanthorion* federation in the eutrophic 'dog-zone' had predominantly small thalli.

Conclusions

London plane trees in West Ham Park show a record of corticolous lichen recolonization which is consistent with observed falling sulphur dioxide levels. This pattern is similar to that described from north and west London. The complications of exfoliating bark as a surface for epiphyte colonization do not appear adversely to affect the potential of these trees for aerial polution monitoring in urban areas. Although the *Desmococcus* community and the *Conizaeoidion* federation generally dominated the flora, these were replaced by the *Xanthorion* on tree bases and by the *Physodion* higher up the trunk to the south and west. At least some elements of the *Xanthorion* may have been present before lower sulphur dioxide levels prevailed, but a diverse mid-trunk *Physodion* community has rapidly developed since the reduction in aerial pollution. Preliminary observations of epiphytes on London planes in rural Essex suggest that *Lecanora expallens, Buellia punctata* and *Diploicia* (*Buellia*) *canescens* can become rather common on tree bases. In addition the *Physodion* is better developed with larger thalli. If the present low levels of sulphur dioxide are maintained, it seems likely that the London plane flora of West Ham Park will also develop these trends.

Addendum

On 17 April 1992 I re-visited West Ham Park in order to collect specimens for checking by Mr J. R. Laundon, and to observe what changes had occurred in the four-year interval since my last visit. Although some larger specimens of *Parmelia sulcata*, *Hypogymnia physodes* and *Evernia prunastri* had grown measurably (and a single 5 mm-diameter specimen of *Parmelia caperata* was also recorded), on almost every tree examined the frequency of smaller thalli was severely reduced, so that the lichen previously identified as cf. *Parmeliopsis ambigua* proved impossible to find. The identification of *P. ambigua* at this site must therefore remain tentative, and the possible confusion with *Parmelia caperata* borne in mind.

Of further interest is the absence of the many previously recorded young foliose and fruticose lichen thalli. The possibility that this is the result of bark exfoliation must be considered, although it is more likely that die-back, related to air pollution was the cause. Unfortunately it seems that very little sulphur dioxide monitoring has been carried out in east London since mid-1988; the London Boroughs of Newham, Tower Hamlets, and Barking and Dagenham, and Rendel Science and Environment, and the Department of the Environment, do not appear to have data for this period. However, it is known that no new major local sources of pollution have started operation, although it must be noted that power stations on the Thames Estuary to the east had previously caused episodes of elevated sulphur dioxide. It is therefore possible that the observed loss of young lichens indicates either a relatively recent short-term rise in sulphur dioxide levels or a longer-term and less-extreme exposure.

Acknowledgements

Many thanks to W. S. Reid (Corporation of London) for allowing survey work in West Ham Park, and to J. Land and J. Gardner (London Borough of Newham) and S. Davidson (Rendel Science and Environment) for supplying sulphur dioxide information. I am also grateful to D. H. Brown (University of Bristol) and J. R. Laundon for help and advice on the manuscript, and to Debbie Boreham for her tireless assistance in the field.

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Book Review

The Land and Freshwater Molluscs of Suffolk. An Atlas and History. By Ian J. Killeen. Suffolk Naturalists' Society. 1992. 171 pp. plus geological map and 34 coloured photographs. £10 in UK, £13 overseas, both post free from the Suffolk Naturalists' Society, The Museum, High Street, Ipswich, Suffolk IP11 9BD. ISBN 0-9508154-4-6.

Ian Killeen is to be congratulated on this model report which is the result of a detailed survey that the author has conducted through Suffolk for over a decade. The mapping is based on 2-km squares and is by far the most comprehensive county survey of Mollusca undertaken in England.

Factors affecting snail distributions are examined and there are useful discussions of the geology and climate of the area, leading to a review of habitat types. A history of recording of non-marine Mollusca in Suffolk is followed by a detailing of the procedures adopted in this study.

The main body of the work is the presentation of the distribution maps and discussion associated with each species. The discussions are detailed, analytical and informative. A comprehensive list of references is followed by some excellent photographs of snails by Derek Rands.

Interpreting distribution patterns is a difficult and complex process and Ian Killeen is not overcautious in his suggestions so that numerous avenues of speculative thought are encouraged. It is interesting to compare the distribution patterns in Suffolk with the British and north-west European distributions given by Kerney (1976) and by Kerney and Cameron (1979) to see just how misleading small-scale patterns might be. Interpretations based on local faunas might seem logical and reasonable, but may prove to be incongrous when compared with overall distributions and ranges. Conversely, insights can be gained from local distributions that are not apparent from wider views.

I was particularly interested in the distributions of *Trichia hispida* and *T. plebeia* because of my earlier investigations into *Trichia* species groups (Naggs 1985). Although the majority of *T. plebeia* records in Suffolk occur in the same 2-km squares as records of *T. hispida*, Ian Killeen does not say if any of these are mixed populations. I am aware of only one such recorded site (Kerney 1969) where morphological changes indicated that an interaction might be taking place between the two species. These changes seem likely to be due either to a narrow band of hybridization and limited gene flow or to an ecological shift which is reflected in the morphology. This is just one of numerous avenues of investigation that can be identified by making use of Ian Killeen's work. The discovery of *Perforatella* in Oxfordshire in 1982 (Naggs 1983) was due to recognition of an anomolous record of what had been identified as *T. plebeia* in Kerney's (1976) *Atlas*.

In summary, this is a useful and very competent work that has been painstakingly produced to a very high standard and is highly recommended.

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F. C. Naggs

Invertebrates Associated with Aquatic Vegetation in the River Cray

By J. Dawkins and S. Donoghue*

Abstract

The invertebrate fauna associated with three species of macrophyte in the River Cray at Foots Cray Meadows was studied. *Sparganium emersum* had a richer fauna than either *Cladophora glomerata* or *Ranunculus* sp. Numbers of blackfly larvae and chironomid larvae were negatively correlated. A rapid general survey of the invertebrate fauna of the river revealed the presence of 27 taxa, indicating that the water was of good quality at the time of sampling.

Introduction

Aquatic macrophytes provide a wide range of microhabitats which can be used by invertebrates as shelter from predators, and as sites for colonization and reproduction. Furthermore, although aquatic plants are not usually consumed directly by invertebrates (Hynes 1970), rooted vegetation acts as a substrate for periphyton, which is an important food source for scrapers such as mayfly nymphs. Krecker (1939), Harrod (1964), and Tokeshi and Pinder (1985) have indicated that fine-leaved plants with a high surface area tend to possess a richer and denser fauna than broad-leaved plants. Relatively little is known, however, about the differential distributions of invertebrate taxa with respect to plant species (Tokeshi and Pinder 1985).

The object of this exercise was to examine the invertebrate fauna associated with three species of plants in the River Cray at Foots Cray Meadows.

The River Cray was classed by Thames Water (Anon. 1988) as a fair quality urban watercourse. It has, however, been affected periodically by pollution events occurring upstream of Foots Cray Meadows: diesel oil (*Sidcup & Bexleyheath Times*, 13 December 1973); caustic soda (ibid. 12 April 1978); oil (ibid. 4 October 1979); rubber latex (ibid. 5 November 1981); oil (ibid. 12 July 1986). Knights (1990) suggested that, as a result of a creosote spillage, polyaromatic hydrocarbons present in the lake sediments of Broomwood lake, which lies approximately 1 km upstream of the study site, represent a potential threat to the River since they might be mobilized by heavy storm flow and carried downstream by the current. In view of this history of pollution, the opportunity was taken to assess the condition of the invertebrate community at Foots Cray Meadows. The fauna of the Cray was most recently investigated by Aston and Andrews (1978) and by Knights *et al.* (1980), who monitored the recovery of the River at Foots Cray Meadows from the caustic soda spill of 1978.

Methods

Initial sampling, with the object of rapidly assessing invertebrate diversity in the River Cray, took place on 15 August 1990. The study area extended some 20 m downstream of Five Arches Bridge and for about 200 m upstream of Five Arches Lake. The lake itself was not sampled. In order to collect invertebrates from a range of microhabitats standard 10-kick samples were taken from stony and silty substrata in areas of differing current velocity. Additionally an FBA net (8 meshes cm^{-1}) was gently swept through a variety of plant beds. Invertebrates were preserved in 70 per cent ethanol and identified in the laboratory.

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Animals dwelling on vegetation were subsequently sampled on 30 August 1990. Quantitative sampling of invertebrates from aquatic vegetation tends to be difficult and destructive owing to the patchy distribution of the fauna and the consequent need to take large numbers of samples to obtain high levels of accuracy and precision. In the interests of habitat conservation it was decided to take relatively few samples of a standard size. The sampler consisted of a 10-cm metal quadrat fitted with a 0.125-mm net bag 15 cm deep. This was held perpendicular to the substratum, with the mouth facing upstream. The net was gently placed over the vegetation to enclose a standard 'netful' of plant material. The vegetation was cut with scissors at the mouth of the net and the sample placed in a polythene bag containing a quantity of 70 per cent ethanol. Three samples were taken from each of two species of angiosperm: *Ranunculus* sp. and *Sparganium emersum*, and four samples from the alga *Cladophora glomerata*.

Results and Discussion

Initial kick-sampling revealed the presence of 27 taxa, of which 20 were identified to genus or species (Figure 1). This gave a score of 9 on the Trent Biotic Index, indicating that at the time of sampling this part of the River was in a reasonably healthy condition in terms of invertebrate diversity and that water quality could be assumed to be good. It should be stressed that this can only be a 'snapshot' of the invertebrate community of the Cray and that the findings are not comparable to those of Aston and Andrews (1978) or of Knights *et al.* (1980) which derived from longer-term studies.

Invertebrates found on the three species of macrophyte are given in Table 1. A total of 16 taxa was recovered, in many cases represented by a small number of individuals. Nine taxa were observed on *Ranunculus*, 10 on *Cladophora glomerata*, and 12 on *Sparganium emersum*. This was unexpected, since the more finely divided structures of *Ranunculus* and *Cladophora* should offer a greater surface area for colonization than the long, strap-like leaves of *Sparganium*. *Asellus aquaticus, Gammarus pulex, Baetis vernus*, simuliid larvae and *Limnaea stagnalis* were common on all three plant species. Leeches were absent from samples taken from *Cladophora* and *Ranunculus*, however the numbers found on *Sparganium* were too small to allow any firm conclusions regarding their distribution to be drawn. Chironomid larvae were common on *Cladophora* and *Sparganium*, but only a solitary individual occurred on *Ranunculus*. Numbers of chironomids were in fact negatively correlated with those of simuliids ($r_s = -0.86$, $p < 0.01$, $n = 10$ in Spearman Rank Correlation*). This probably reflects the different feeding strategies used by these insects. Tokeshi and Pinder (1985), studying the distributions of invertebrates on *Potamogeton* spp., found that filter-feeding blackfly larvae tended to be more abundant at the apexes of individual plants, whereas chironomids were more widely distributed. Aggregations of blackfly larvae may prevent the formation of a film of periphyton and detritus on which many chironomids feed.

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*r_s is the Spearman Rank Correlation Coefficient, p is the associated probability (if less than 0.05 there is a significant correlation), and n is the number of observations.

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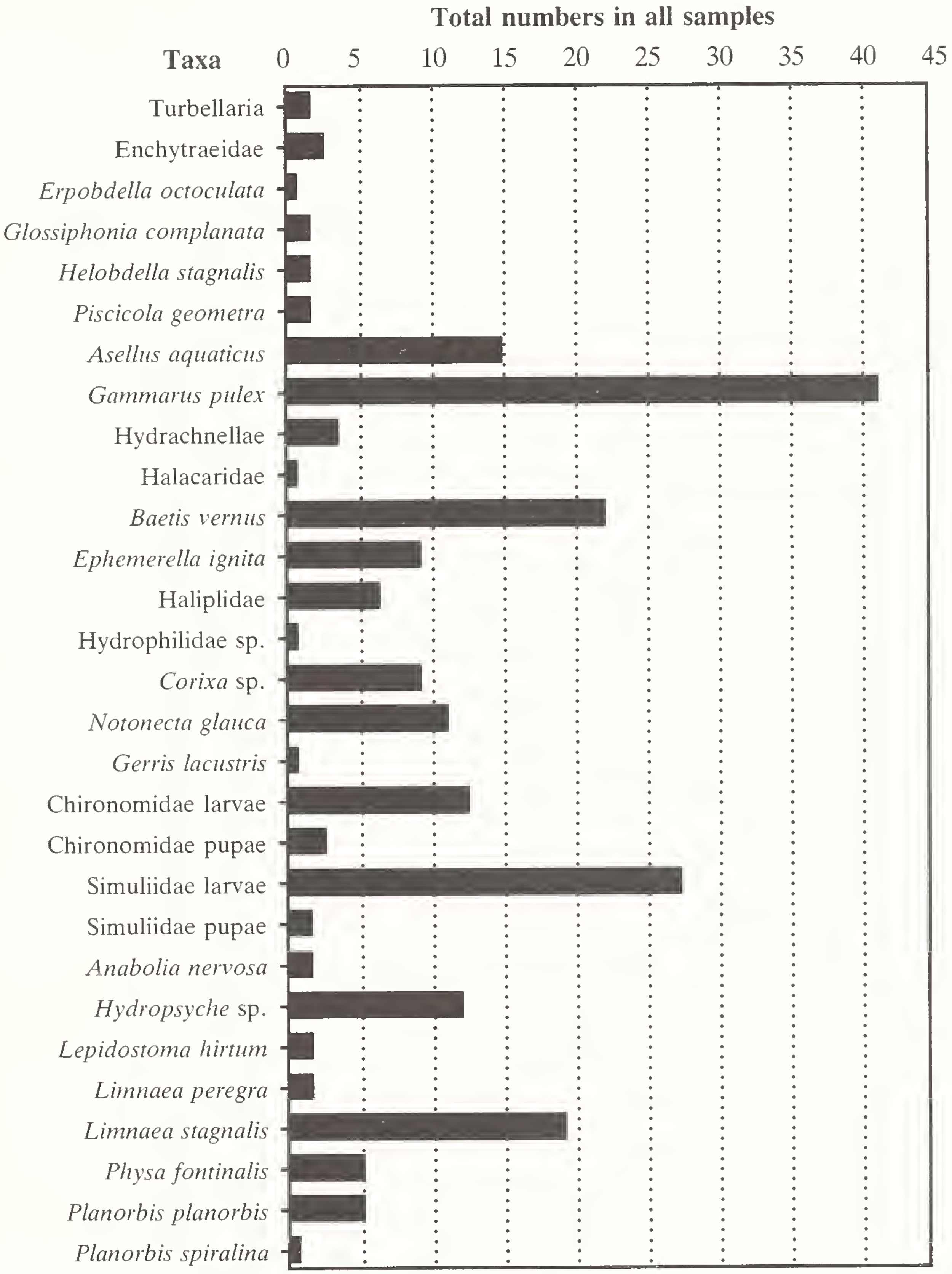

FIG. 1. Invertebrates collected at Foots Cray Meadows by kick-sampling and sweep-sampling through vegetation, 15 August 1990. Observations have been pooled.

Table 1 follows:

Table 1. Numbers of invertebrates in vegetation samples from the River Cray, 30 August 1990.
*S.D. = standard deviation.

Invertebrate Taxa	*Cladophora glomerata*				Mean	S.D.*	*Ranunculus*			Mean	S.D.*	*Sparganium emersum*			Mean	S.D.*
ANNELIDA																
Hirudinea																
Glossiphonia complanata	—	—	—	—	—	—	—	—	—	—	—	1	—	—	0.3	0.5
Erpobdella octoculata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.7	0.9
ARTHROPODA																
CRUSTACEA																
Asellus aquaticus	7	—	3	—	5.0	2.0	—	—	2	0.7	0.9	2	1	—	1.5	0.5
Gammarus pulex	5	—	2	14	7.0	5.1	—	—	8	2.7	3.8	5	1	—	2.0	2.2
ARACHNIDA																
Hydracarina																
Hydrachnellae	—	—	—	—	—	—	—	—	1	0.3	0.5	—	1	—	0.3	0.5
INSECTA																
Ephemeroptera																
Baetis niger	—	—	—	—	—	—	—	—	1	0.3	0.5	—	—	—	—	—
Baetis vernus	9	45	45	41	35.0	15.1	1	10	79	30.0	34.8	9	41	41	30.3	15.1
Ephemerella ignita	1	1	—	—	0.5	0.5	—	—	—	—	—	—	—	—	—	—
Hemiptera	1	—	—	—	0.3	0.4	—	—	—	—	—	—	—	—	—	—
Diptera																
Chironomidae larvae	3	6	1	2	2.8	1.7	—	1	—	1.0	0.0	8	—	—	3.0	3.6
Chironomidae pupae	—	1	—	—	0.3	0.4	—	—	—	—	—	—	—	—	—	—
Simuliidae sp. larvae	—	—	3	1	1.0	1.2	7	2	3	3.8	1.9	1	4	5	3.3	1.7
Trichoptera																
Hydropsyche	—	—	1	—	0.3	0.4	1	—	—	0.3	0.5	—	—	—	—	—
Sericostoma personatum	1	—	—	—	0.3	0.4	—	—	—	—	0.5	1	—	—	0.3	0.5
MOLLUSCA																
Limnaea peregra	—	—	—	—	—	—	—	—	—	—	—	1	—	—	0.3	0.5
Limnaea stagnalis	2	—	8	—	2.5	3.3	2	3	8	4.3	2.6	10	4	1	5.0	3.7
Sphaerium corneum	—	—	—	—	—	—	—	—	—	—	—	2	—	—	0.6	0.9

Notes on the Fauna and Flora of Shooters Hill, Including Oxleas Wood SSSI, With Particular Reference to the Years 1943–1958

By John F. Burton*

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Summary

Shooters Hill (130 metres above sea-level) is a prominent landmark in south-east London just inside the former boundary of the old County of London where it bordered Kent. It has attracted much attention in recent years because of the threat to its eastern lower slopes, particularly the ancient woodland of the Oxleas Wood SSSI, posed by the construction of the proposed East London River Crossing. Until this threat materialised, little had been published specifically about the flora and fauna of this important open space in a largely built-up area. Nevertheless, it was much visited by the author and others from 1943 to 1958, and the present account of the flowering plants, ferns, mammals, amphibians, reptiles, birds, Orthoptera and Macrolepidoptera recorded during this period is given to help fill this gap and provide further documentation of the rich wildlife interest of the area to that already published in recent years. Known records from earlier and later periods are also included for comparison.

As far back as records exist, 311 species of flowering plants and ferns; 19 species of mammals, amphibians and reptiles; 81 species of birds and 275 species of Macrolepidoptera have been recorded on Shooters Hill. Of the 'all time' list of 275 species of Macrolepidoptera, 107 species (39 per cent) are particularly associated with ancient woodland. Of these 107, 62 (58 per cent) were still surviving after 1943 and 51 (48 per cent) after 1980.

Introduction

In view of the urgent need to conserve the ancient semi-natural woodlands on the London Clay slopes of Shooters Hill (130 metres above sea-level) in the Borough of Greenwich, south-east London, and therefore to gather all possible data on its ecology, past and present, a personal account, supplemented with the past and present observations of others, is provided here of some of the wildlife of the area during the period 1943-58 inclusive, when I was resident in Greenwich. In May 1984 I supplied an early manuscript summary of my personal observations to the London Wildlife Trust for use in connection with the Public Enquiry into the East London River Crossing, a major road development threatening the Oxleas Wood SSSI on the south-eastern flank of Shooters Hill, which was held from October 1985 to December 1986. The Inspector subsequently recommended that the construction of the road through

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Oxleas and Shepherdleas Woods should be allowed. I also published (Burton 1984) a popular account of the wildlife of Shooters Hill to support the nature conservation case.

Milner (1988) has given a good description of the woodlands of the area and I feel little need to add to this, except to mention that they once formed part of the vast and ancient Forest of Anderida that stretched across the Weald of Kent and extended its arms through gaps in the North Downs (Church 1956). Until about 1900 larger fragments of this remained than is the case today (see Figure 1 for situation *c.* 1800). Oxleas Wood formed the southern portion of what was then called Crown Woods, with Shooters Hill Wood forming the northern part. Farther east, West Wood was a large wood which extended unbroken from the eastern boundary of Crown Woods to Blackfen and Danson Park. The entomologist William West (1906) described it as 'a very pretty wood' in the 1860s, 'since grubbed up and destroyed'; this destruction seems therefore to have occurred in the 1890s. In the early nineteenth century part of Shepherdleas Wood appears to have been meadowland, as its name implies; indeed Oxleas Meadow was then known as Upper Shepherdleas. Some older local residents in the 1940s still referred to Oxleas Wood as Crown Woods.

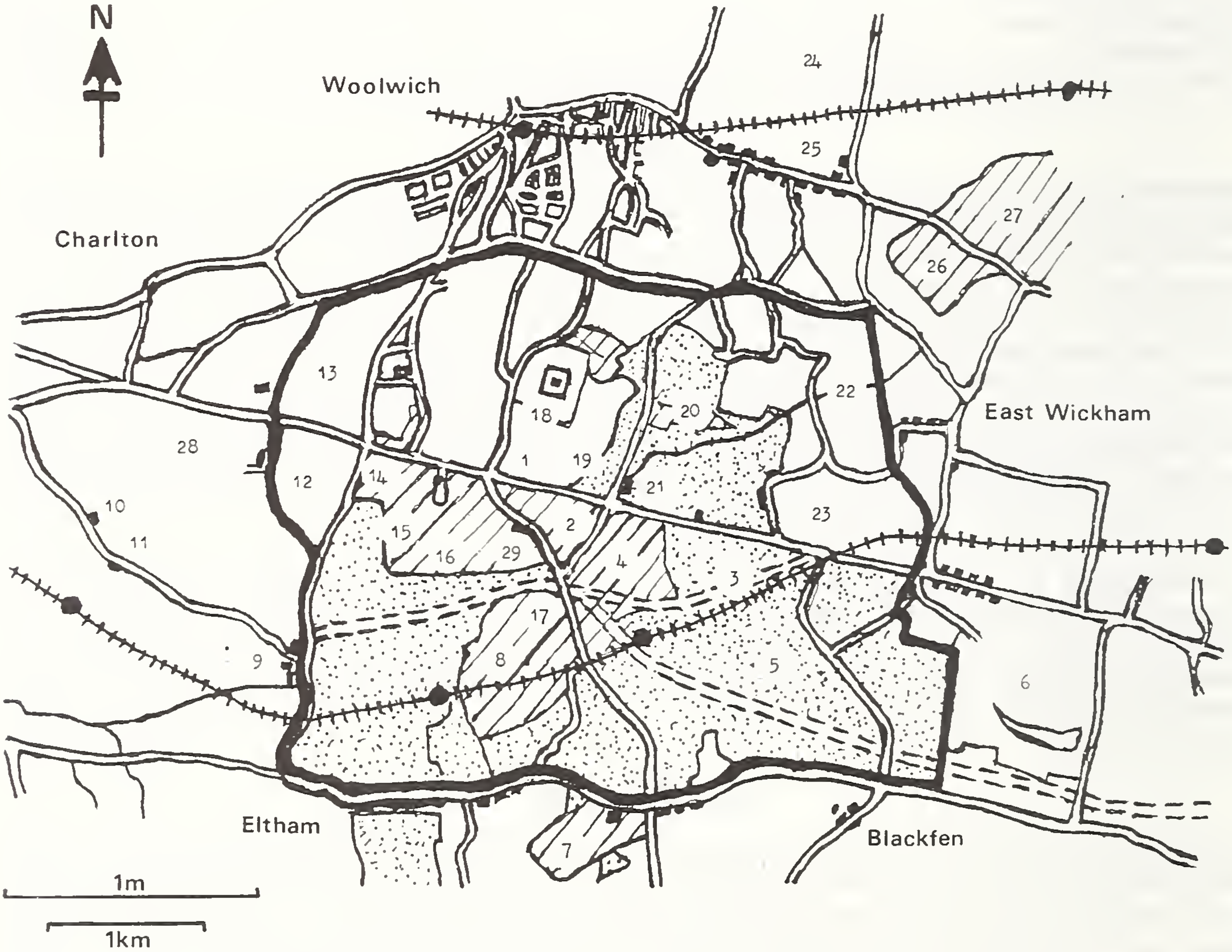

Fig. 1. Shooters Hill area showing extent of open country (mainly arable) and woodland and scrub (stippled and diagonally hatched) *c.*1800, and extent of woodland remaining *c.*1945 (diagonally hatched only). Major roads === and railways ++++ added since 1800 have been superimposed.
1 Shooters Hill summit, 2 Shooters Hill Wood, 3 Crown Woods, 4 Oxleas Wood, 5 West Wood, 6 Danson Park, 7 Avery Hill, 8 Eltham Park, 9 Well Hall, 10 Upper Kidbrooke, 11 Lower Kidbrooke, 12 Kidbrooke Common, 13 Woolwich Common, 14 Eltham Common, 15 Castlewood, 16 Jackwood, 17 Shepherdleas Wood, 18 Shrewsbury House, 19 Shooters Hill Golf Course, 20 Clothmakers Wood, 21 Woodlands Farm, 22 Plumstead River, 23 Shoulder of Mutton Heath, 24 Plumstead Marshes, 25 Plumstead, 26 Bostall Woods, 27 Lesnes Abbey Woods, 28 'The Nine Fields', 29 Oxleas Meadow.

Shooters Hill Golf Course, situated on the north-eastern slopes on the opposite side of the A207 Roman road from Oxleas Wood, does need description. In the latter part of the nineteenth century and the early part of the twentieth, most of the woodland there was cleared and its place taken by the golf course. Small fragments of the original woodland, notably Clothmakers Wood (sometimes called Clothworkers or Abattoir Wood), still survive, but are now denser and less attractive than they were in the 1940s and 1950s (Figures 2 and 3). Two small streams arising near the summit of Shooters Hill flow

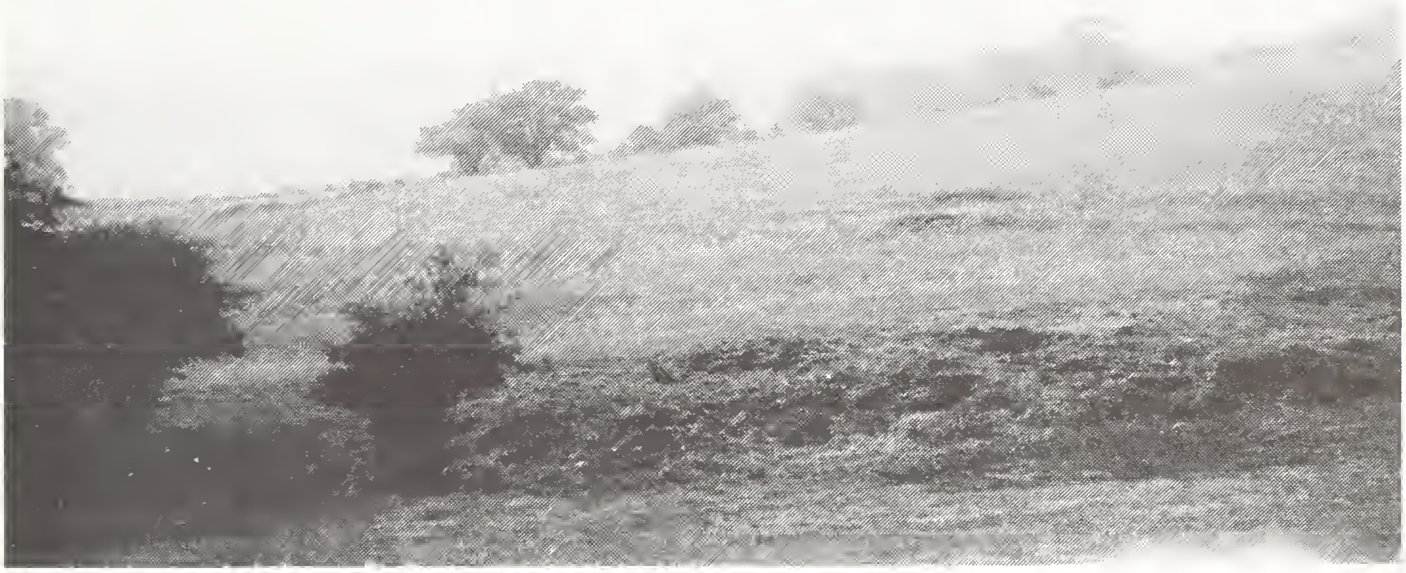

Fig. 2. Looking south-west over Shooters Hill Golf Course, May 1947. Oxleas Wood in background.

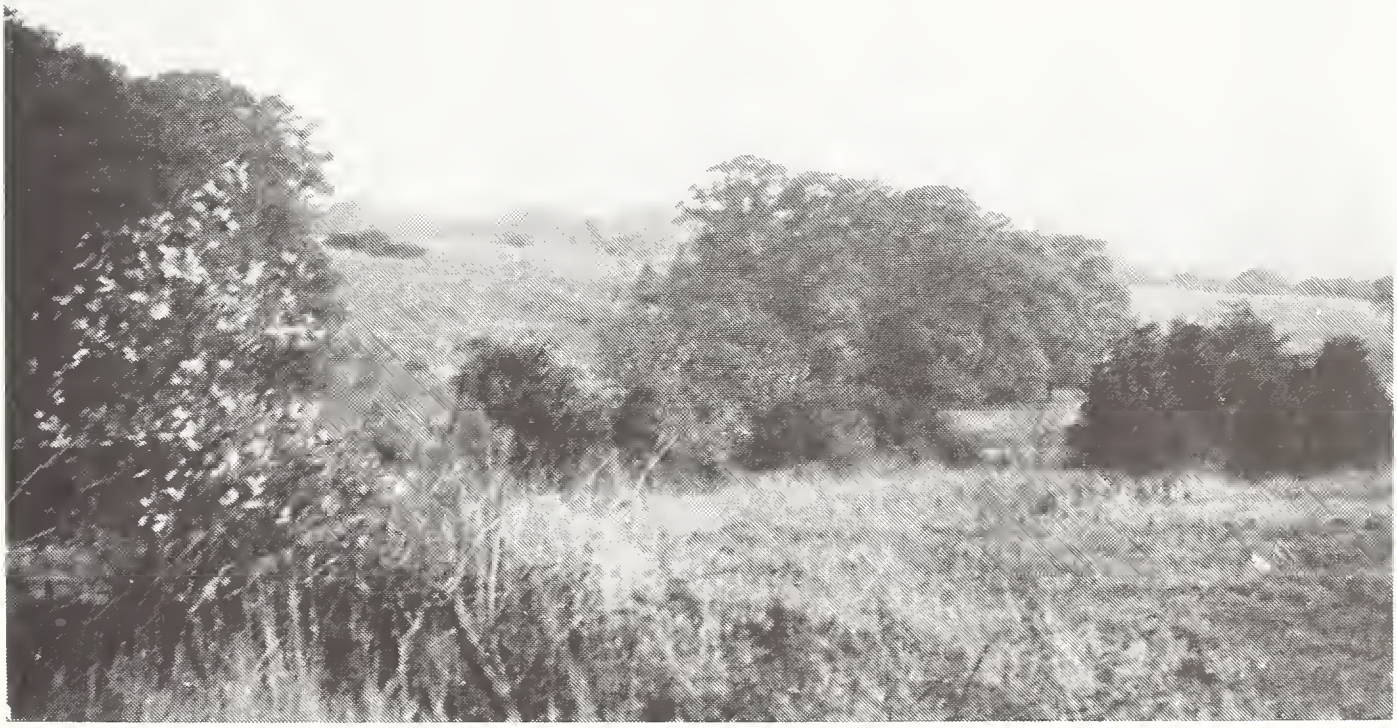

Fig. 3. Looking east-north-east over Shooters Hill Golf Course towards East Wickham, May 1947. The rough grassland in the foreground has since been incorporated into the golf course.

eastwards down the slopes of the golf course, combine with each other and then combine again with another, northwards-flowing, stream (the Plumstead River) which, arising in Oxleas Wood, follows a course through the fields of Woodlands Farm. Still in operation in the 1950s, but now managed by a company, Woodlands Farm was thus the last old-style, working farm in the former County of London, outlasting Coldharbour Farm, not far away at Mottingham, for which this 'honour' was incorrectly claimed by Fitter (1945). Coldharbour Farm was submerged under housing estates in the late 1940s.

As an indication of the strategic importance of Shooters Hill for wildlife, it is worth pointing out that even nowadays, as a glance at the 1:50,000 Ordnance Survey map shows, it forms a vital link in an almost unbroken corridor of open spaces extending north-eastwards from the North Downs south of Keston through Bromley Common, Sundridge Park, Elmstead Wood, Mottingham, south Eltham and Eltham Park, thence via Shooters Hill Golf Course and Woodlands Farm, East Wickham, Bostall Woods and Lesnes Abbey Woods to Erith Marshes and the Thames. North across the Thames this corridor continues via the currently threatened Rainham Marshes to the open Essex countryside between Upminster and South Ockendon. This corridor is presumably important for the movement and, therefore, genetic flow of highly mobile animals, such as birds and many insects.

The roughs between the fairways of the golf course were left relatively wild and untreated with chemicals during the 1940s and 1950s, but this was not the case when I visited the area in August 1983. A large, rough grassy slope rich in wild flowers which used to exist between the A207 and the golf course, partly occupied in the 1940s by a prisoner-of-war camp, was ploughed up in November 1949 and incorporated into the golf course. It used to provide an excellent breeding habitat for grey partridges *Perdix perdix*, skylarks *Alauda arvensis* and yellowhammers *Emberiza citrinella*, and for large numbers of butterflies, notably meadow browns *Maniola jurtina*, wall browns *Lasiommata megera*, small heaths *Coenonympha pamphilus*, common blues *Polyommatus icarus*, small skippers *Thymelicus sylvestris* and Essex skippers *T. lineola*. In 1946, and again in 1947, at least one pair of probably nesting hobbies *Falco subbuteo* hunted over this area and the golf course. In May of the latter year 1947, two pairs careered in display flights over the site and were watched at close quarters perching on the now dismantled POW huts. Although D. F. Owen and I never actually found a nest, we had little doubt that they nested in the adjacent woodlands, probably Oxleas Wood, parts of which were then excluded from public access. In any case, we did not wish to disturb them by searching for a nest.

In the 1940s and 1950s, Woodlands Farm used to consist of both arable land and pasture grazed by cattle where grey partridges, skylarks and yellowhammers nested (Figure 4). As mentioned above, considerable areas of Oxleas Wood were not then open to the public, access being confined to the fenced footpaths. My observations at this time (I did not leave school until 1948) were thus somewhat restricted as I was refused a permit by the old London County Council Parks Department, which then managed the Shooters Hill woods, to explore the off-limits areas. Oxleas Meadow, on the west side of Oxleas Wood was open to the public, however, and presented a wilder appearance than it does today, due to wartime neglect. The grass was often long with a profusion of common wild flowers, not being mown as regularly as nowadays. A few yards within the western edge of Oxleas Wood from Oxleas Meadow a clearing used to exist, partly overgrown with brambles *Rubus fruticosus* and other shrubs, known to K. H. Hyatt, D. F. Owen and myself as 'The Glade of the Burnets', because it formerly held once-flourishing colonies of the five-spot and six-spot burnet moths *Zygaena trifolii* and *Z. filipendulae*. It may once have been the garden of an old building whose foundations adjoined it farther in the wood. In August 1983, Owen and I found the glade virtually impossible to recognize as it had matured into thick woodland and the foundations of the building had been grassed over.

Public access to the woodlands of Jackwood (Figure 5), Castlewood and, on the western side of Shooters Hill, Eltham Common, was much less restricted in the 1940s and 1950s than to Oxleas Wood, and I was able to visit them relatively more frequently. Shepherdleas Wood I explored comparatively rarely.

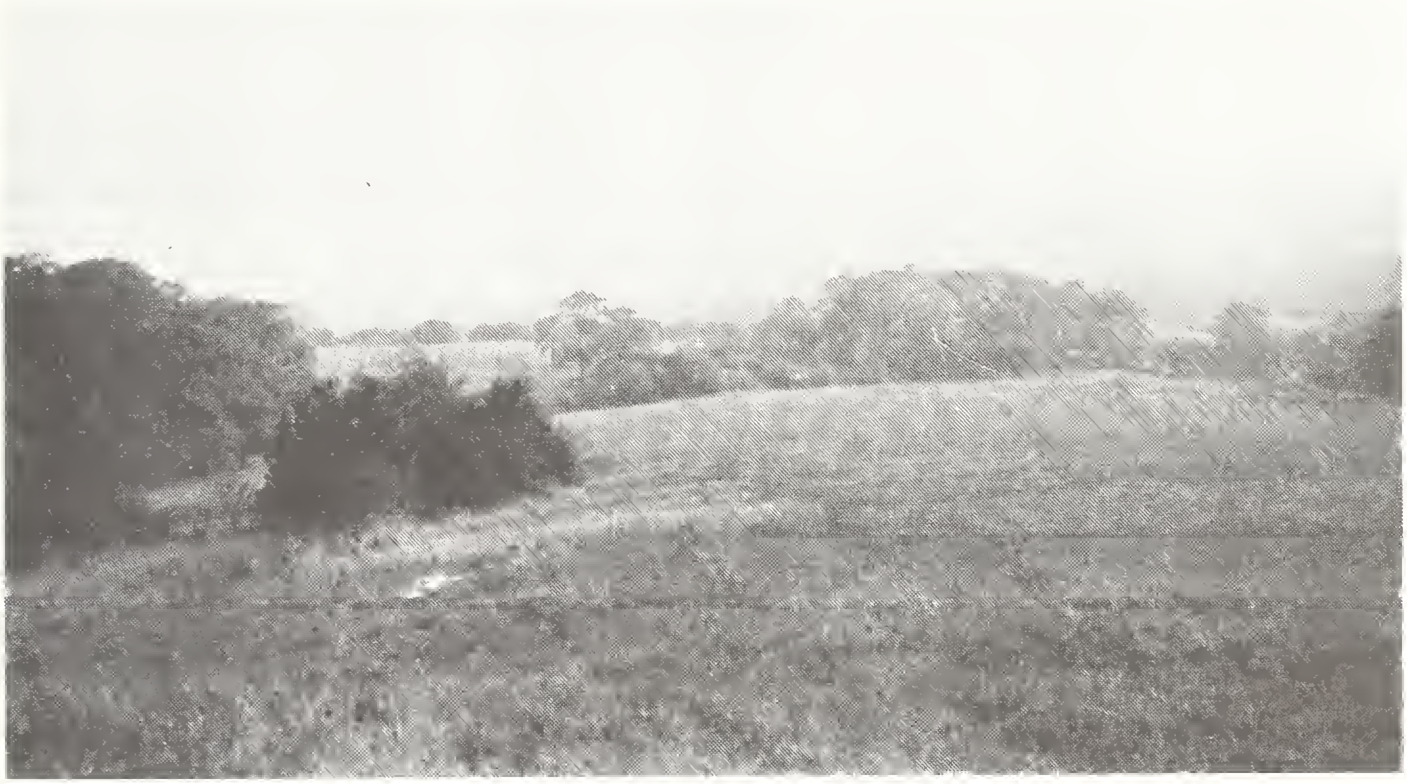

FIG. 4. Looking north-east from Shooters Hill towards Plumstead. Hobbies frequented this area in the 1940s when this photograph was taken in May 1947.

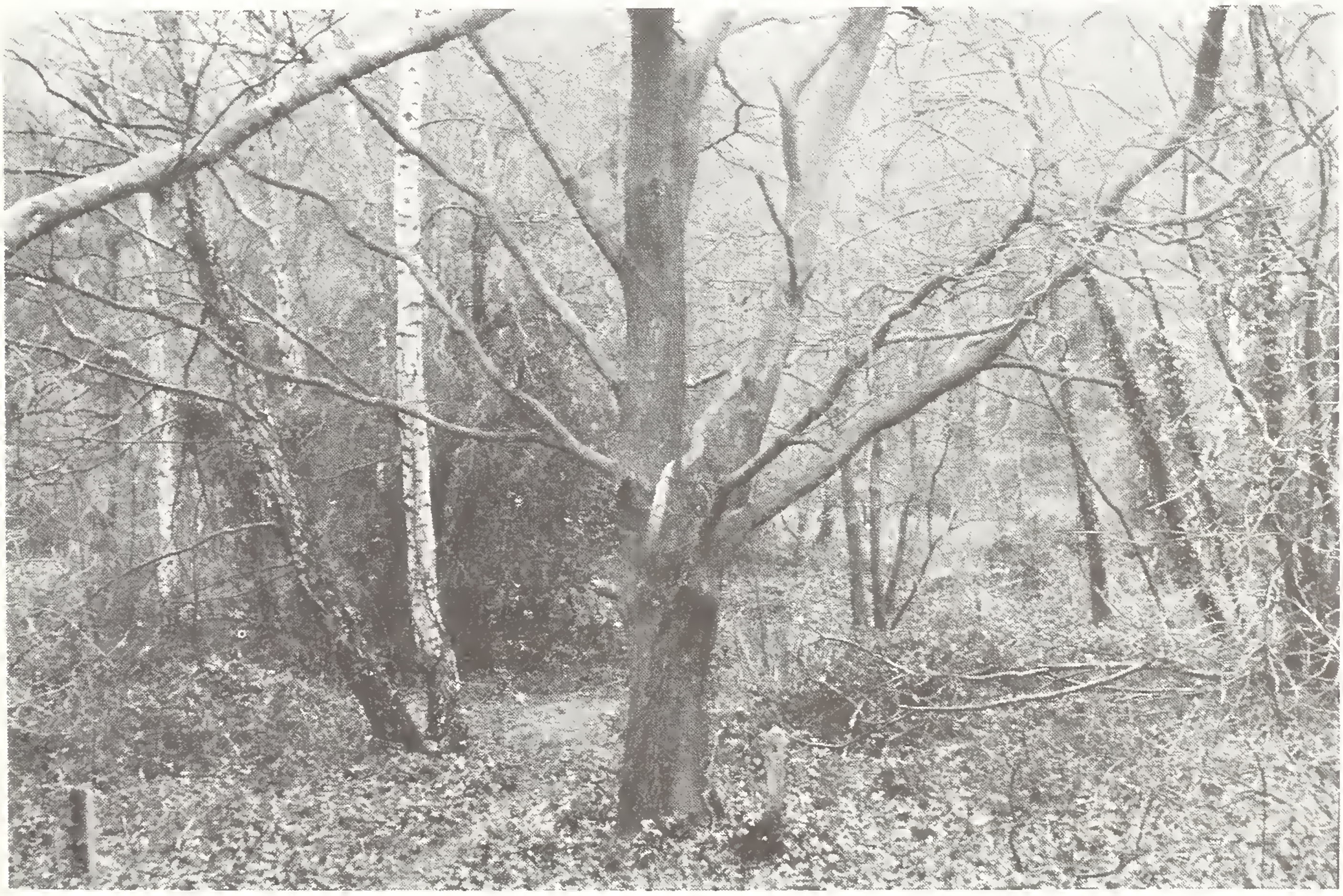

FIG. 5. Inside Jackwood, Shooters Hill, March 1984.

In appraising the following species lists it should be borne in mind that my particular interests are ornithology and entomology (especially Lepidoptera and Orthoptera), and that my botanical knowledge is essentially that of an entomologist.

Flowering Plants, Ferns and Horsetails

As with the succeeding faunal lists, I have included records made by others in the years before and after, as well as during the period 1943-58. The authors of these for the plants are Bale (1986), Burton (1983), Grinling *et al.* (1909), Kent and Lousley (1951-7), Pitt (1982) and Swales *et al.* (1989); all simply referred to by name only hereafter, except for the sake of clarity in some instances. Apart from these sources, I have not attempted an exhaustive search of the literature. My indication of frequency for 1943-58, which generally appears first, is subjective. Plant sequence and nomenclature follow Burton (1983).

Common horsetail *Equisetum arvense:* locally plentiful.

Bracken *Pteridium aquilinum:* Pitt's assessment as 'only locally common in some areas of the woodlands' also reflects its status in 1943-58.

Hard fern *Blechnum spicant:* recorded from an unspecified location on Shooters Hill in 1725 (Grinling *et al.*). Not noted by me.

Male fern *Dryopteris filix-mas:* frequent in the damper parts of Castlewood, Jackwood, Oxleas Wood and the golf course woods. Reported by Pitt as occurring 'along ditches and in damper areas'.

Scaly male fern *D. pseudomas:* not noted by me, but reported in 1982 'along one ditch in the lower part of Oxleas Wood' by Pitt.

Common buckler fern *D. dilatata:* present in Jackwood and Oxleas Wood, where in 1982 Pitt reported it 'occasional in Oxleas Wood particularly'.

Scots pine *Pinus sylvestris:* locally frequent.

Corsican pine *P. nigra* var. *maritima:* a planted stand of this tree has been reported by Bale in the middle of Jackwood.

Yew *Taxus baccata:* at least a few, presumably planted trees, here and there. Seedlings reported by Pitt in the northern part of Oxleas Wood.

Wood anemone *Anemone nemorosa:* widespread and plentiful in Oxleas and Shepherdleas Woods, as is still the case. Also present on south side of Eltham Common and in ancient hedge bottom on Woodlands Farm (Swales *et al.*).

Meadow buttercup *Ranunculus acris:* common, especially on the golf course.

Creeping buttercup *R. repens:* common.

Bulbous buttercup *R. bulbosus:* common, especially on the golf course.

Lesser spearwort *R. flammula:* not recorded by me or Pitt, but there is an old record for 'Shooters Hill' from 1902 (Grinling *et al.*).

Lesser celandine *R. ficaria:* common, especially on the golf course.

Common or **corn poppy** *Papaver rhoeas:* frequent along roadside verges, on disturbed ground and around the field borders of Woodlands Farm.

Long-headed poppy *P. dubium:* distribution as *P. rhoeas*, but less frequently noted.

Greater celandine *Chelidonium majus:* frequent in hedgerows and rough roadside verges, especially on the north side of the Hill.

Climbing corydalis *Corydalis claviculata:* found by Wolley-Dod about the turn of the century near Severndroog Castle in Castlewood (Grinling *et al.*).

Fumitory *Fumaria officinalis* agg.: frequent on disturbed ground around Woodlands Farm and on the adjacent golf course.

Charlock *Sinapis arvensis:* plentiful on disturbed ground on the golf course and Woodlands Farm.

Annual wall rocket or **stinkweed** *Diplotaxis muralis:* frequent on disturbed ground on the north and west sides of the Hill.

Perennial wall rocket *D. tenuifolia:* locally common on disturbed and waste ground, and on roadside verges.

Narrow-leaved pepperwort *Lepidium ruderale:* as last species.

Common wart cress *Coronopus squamatus:* frequent at Woodlands Farm and occasionally elsewhere on north side of the Hill.

Hoary cress *Cardaria draba:* locally abundant on disturbed ground.

Wild candytuft *Iberis amara:* reported from Shooters Hill in 1835 (Burton 1983), presumably on the more open north side of the Hill. Not noted subsequently.

Shepherd's purse *Capsella bursa-pastoris:* abundant on cultivated and disturbed ground.

Horse-radish *Armoracia rusticana:* frequent on disturbed and waste ground.

Lady's smock *Cardamine pratensis:* frequent in Oxleas Meadow and on the damper, lower slopes of the golf course.

Hairy bittercress *S. hirsuta:* frequent in suitable habitats; also noted by Pitt.

Marsh yellow cress *Rorippa islandica:* found in the former Crown Woods about the turn of the century by Wolley-Dod (Grinling *et al.*).

Dame's violet or **sweet rocket** *Hesperis matronalis:* not noted by me or Pitt but recorded near Severndroog Castle in Castlewood by Wolley-Dod (Grinling *et al.*).

Garlic mustard *Alliaria petiolata:* common in the more open parts and wood borders of Oxleas Wood, and also on the golf course margins. Also noted along woodland edges by Pitt.

Hedge mustard *Sisymbrium officinale:* common in suitable habitats, especially around the golf course.

Weld *Reseda luteola:* frequent on disturbed ground.

Wild mignonette *R. lutea:* frequent on rough grassy areas of the golf course and occasionally elsewhere.

Common dog violet *Viola riviniana:* common in Castlewood, Jackwood, Oxleas Wood and Shepherdleas Wood, and on the golf course. Also reported in Oxleas Wood in 1982 by Bale and Pitt.

Wood dog violet *V. reichenbachiana:* status as *riviniana:* also reported in Oxleas Wood 1982 by Pitt and in 1987 and 1988 by Milner (1988).

Common St John's wort *Hypericum perforatum:* common on the golf course.

Red campion *Silene dioica:* frequent.

White campion *S. alba:* common everywhere.

Common mouse-ear *Cerastium holosteoides:* common; also reported in 1982 by Pitt.

Little mouse-ear *C. semidecandrum:* not noted by me, but reported by Pitt in 1982 to be 'present in turf in open grassland on pebble beds in upper parts of Oxleas'.

Common chickweed *Stellaria media:* common; also reported by Pitt.

Greater stitchwort *S. holostea:* common on the golf course.

Lesser stitchwort *S. graminea:* common, especially on the golf course; also reported in 1982 from the woodlands on the south side of the Hill by Pitt.

Three-veined sandwort *Moehringia trinervia:* plentiful.

Corn spurrey *Spergula arvensis:* frequently seen on the north side of the Hill, including the golf course and Woodlands Farm.

Sand spurrey *Spergularia rubra:* frequent on parts of the golf course and Woodlands Farm.

Many-seeded goosefoot *Chenopodium polyspermum:* frequent in suitable, disturbed habitat.

Fat hen *C. album:* common weed of disturbed ground, especially around Woodlands Farm and elsewhere on the north side of the Hill.

Red goosefoot *C. rubrum:* noted at Woodlands Farm.

Halberd-leaved orache *Atriplex hastata:* frequent on waste ground.

Common orache *A. patula:* ditto.

Common lime *Tilia europaea:* planted trees frequent.

Common mallow *Malva sylvestris:* common.

Cut-leaved crane's-bill *Geranium dissectum:* locally common, especially on the golf course.

Dove's-foot crane's-bill *G. molle:* common, including Oxleas Meadow and Wood, and the golf course.

Herb Robert *G. robertianum:* common, especially in Oxleas Wood and on the golf course.

Wood sorrel *Oxalis acetosella:* frequent in Jack Wood, Oxleas Wood and in small woods on the golf course. Reported in 1982 as widespread, but not abundant throughout Jack and Oxleas Woods, especially on drier soils associated with pebble beds, by Pitt and also from Oxleas Wood in 1986-8 by Milner (1988).

Sycamore *Acer pseudoplatanus:* frequent in most of the woods as confirmed by Bale's 1982 survey. In the same year, Pitt reported that this tree has seeded into the edges of Oxleas Wood and Jackwood from large planted trees within open grassland areas and from street trees.

Field maple *A. campestre:* occasional in Oxleas Wood and more rarely in the other woodland areas, as found in 1982 by Pitt and Bale. Pitt mentioned that this species is present in old hedgerows bordering Oxleas Wood and Oxleas Meadow. Also present in a relict hedge on southern margin of Eltham Common and in Clothmakers Wood (Swales *et al.*).

Horse chestnut *Aesculus hippocastanum:* occasional trees on the north side of Shooters Hill and also along the edge of Oxleas Wood adjacent to Oxleas Meadow. Not noted by Pitt or Bale.

Holly *Ilex aquifolium:* common and widespread, as also reported by Pitt and Bale.

Common buckthorn *Rhamnus cathartica:* locally frequent in Castlewood, Jackwood and Oxleas Wood in the 1940s and early 1950s, but apparently now very local as only found by Bale in Oxleas Wood and reported by him to be rare.

Gorse *Ulex europaeus:* frequent on the golf course and Eltham Common, occasional elsewhere. Reported by Pitt without comment. Still present on Eltham Common as understorey in woodland (Swales *et al.*).

Broom *Sarothamnus scoparius:* a few clumps on the golf course.

Rest harrow *Ononis repens:* locally frequent on the golf course.

Black medick *Medicago lupulina:* plentiful in Oxleas Meadow and common on the golf course.

Spotted medick *M. arabica:* locally frequent on the drier, lighter soils of the Hill.

Common melilot *Melitotus officinalis:* frequent on waste ground on the north side of the Hill, including the golf course margins.

White melilot *M. alba:* as above, but not so frequent.

Common yellow trefoil *Trifolium dubium:* plentiful, especially on the golf course roughs.

Hop trefoil *T. campestre:* frequent on waste ground, especially on the north side of Shooters Hill.

Alsike clover *T. hybridum:* frequent on waste ground, especially on the north side of the Hill.

White clover *T. repens:* common.

Red clover *T. pratense:* plentiful in Oxleas Meadow and on the golf course.

Common bird's-foot trefoil *Lotus corniculatus:* common on the golf course, and occasional elsewhere.

Smooth tare *Vicia tetrasperma:* occurs on southern part of Woolwich Common (Swales *et al.*).

Tufted vetch *V. cracca:* common on the golf course, frequent elsewhere and formerly on the 'Nine Fields', west of the Hill, built over in 1947.

Bush vetch *V. sepium:* frequent; also reported by Pitt without comment.

Common vetch *V. sativa:* common, especially on the golf course.

Narrow-leaved vetch *V. angustifolia:* common on the golf course.

Common yellow vetchling (meadow pea) *Lathyrus pratensis:* plentiful on the golf course and in Oxleas Wood.

Raspberry *Rubus idaeus:* rare: in Oxleas Wood, as also recorded by Bale.

Bramble *Rubus fruticosus* agg.: abundant.

Barren strawberry *Potentilla sterilis:* frequent; also reported by Pitt without comment.

Silverweed *P. anserina:* common, especially on the golf course.

Tormentil *P. erecta:* common on the golf course and, as also reported by Pitt, on drier ground in Oxleas Wood.

Creeping cinquefoil *P. reptans:* common in Castlewood, Jackwood, Oxleas Wood and on the golf course. Also reported by Pitt without comment.

Wild strawberry *Fragaria vesca:* frequent on the golf course.

Herb bennet (wood avens) *Geum urbanum:* common in Oxleas and the other woods on the south side of the Hill; also on the golf course. Reported in Oxleas Wood by Pitt without comment.

Agrimony *Agrimonia eupatoria:* frequent on the golf course.

Field rose *Rosa arvensis:* a few noted on the golf course.

Dog rose *R. canina* agg.: plentiful on and around the golf course and in Oxleas Wood.

Blackthorn *Prunus spinosa:* frequent, especially on and around the golf course (including the boundary stream with Woodlands Farm) and in Oxleas Wood. Pitt noted it 'along old hedgerows in southern part of Oxleas, but occasional elsewhere'. Bale also recorded it in several places in Oxleas Wood in 1982.

Wild cherry (gean) *P. avium:* frequent in Jackwood and Oxleas Wood and occasional in the woodland fragments on the golf course. Pitt reported 'several large and very old trees in east part of Oxleas Wood, but younger trees also occasional and scattered throughout', and this was confirmed by Bale's autumn 1982 survey.

Bird cherry *P. padus:* a tree reported at the back of Shrewsbury House, Shooters Hill in 1836 (Grinling *et al.*).

Midland or **woodland hawthorn** *Crataegus laevigata = oxyacanthoides:* occasional in the woodlands on the south side of the Hill and in the golf course woodland remnants. Still the situation in the early 1980s, according to Bale, Pitt, and Swales *et al.* First recorded in Crown Woods by Wolley-Dod around the turn of the century (Grinling *et al.*).

Common hawthorn *C. monogyna:* abundant throughout, as confirmed in the 1980s by Bale and Pitt who observed many hybrids.

Rowan *Sorbus aucuparia:* frequent, especially on the golf course. Pitt noted it as 'widespread, especially on pebble beds', while Bale also found it widespread in his autumn 1982 survey of Oxleas, Shepherdleas and Jackwoods.

Whitebeam *S. aria:* not noted by me, but recorded as occasional in the woods on the south side of the Hill by Pitt (1982) who also found hybrids between this species and rowan in the upper part of Oxleas Wood, and between it and wild service tree on the north-west edges of Shepherdleas Wood.

Wild service tree *S. torminalis:* first reported in Crown Woods, Shooters Hill, in 1906 (Grinling *et al.*). Noted by me as frequent in Oxleas Wood, and subsequently reported by Pitt and Bale from Shepherdleas Wood and Jackwood as well. Pitt remarked in her report: 'Oxleas Woods, Jackwoods, in a wide belt, but isolated trees also appearing throughout. Some old large trees in circles (original tree no longer present), giving weight to argument that woodland is ancient. Some trees have been coppiced in past within woodland and along old hedgebank between Oxleas Wood and meadows'. Recently reported by Swales *et al.* from Clothmakers Wood and an ancient hedgerow on Woodlands Farm.

Wild pear *Pyrus communis:* a few trees in Oxleas Wood and on Eltham Common, as later noted by Bale, Pitt, and Swales *et al.*; Pitt reporting the presence of a very old tree in the centre of this wood.

Crab apple *Malus sylvestris:* in Grinling *et al.*, this tree is reported from Eltham Common, on the west side of Shooters Hill, where I noted some in the 1940s and 1950s, as well as in Jackwood, Oxleas Wood and on the golf course. Bale and Pitt reported occasional trees throughout the southern woods, especially in Oxleas Wood.

Cultivated apple *M. domestica:* not noticed by me, but reported from the woods on the southern slopes by Pitt without comment on its status.

Wall pepper *Sedum acre:* frequent on old air-raid shelters and walls on Eltham Common and in Castlewood and Jackwood.

Orpine *S. telephium:* reported from Shooters Hill in 1787 (Grinling *et al.*); no subsequent records.

Broad-leaved willow-herb *Epilobium montanum:* frequent in Castlewood, Jackwood, Oxleas Wood and at the edges of the golf course. Also recorded by Pitt without comment.

American willow-herb *E. adenocaulon:* frequent here and there on many parts of Shooters Hill.

Square-stemmed willow-herb *E. tetragonum:* recorded on Shooters Hill in 1864 (Grinling *et al.*). Not noted by me.

Rose-bay willow-herb *Chamaenerion angustifolium:* reported from Crown Woods, Shooters Hill in 1903 (Grinling *et al.*). Frequent in the woods on the south side of the Hill and plentiful on parts of the golf course and around Woodlands Farm in the 1940s and 1950s. Also noted as occasional or frequent in Oxleas Wood by Bale.

Lesser evening primrose *Oenothera biennis:* reported from Shooters Hill in 1836 (Grinling *et al.*). Not noted by me.

Common enchanter's nightshade *Circaea lutetiana:* plentiful on the golf course and in parts of Oxleas Wood and Eltham Common. Noted in Oxleas Wood by Bale, but not by Pitt. Still present on Eltham Common (Swales *et al.*).

Dogwood *Thelycrania sanguinea:* occasional in Oxleas Wood, as also reported recently by Pitt and Bale. Locally frequent on Eltham Common.

Ivy *Hedera helix:* common throughout; also noted by Bale and Pitt.

Sanicle *Sanicula europaea:* noted by me as occasional in the 1940s and 1950s on Eltham Common and in Oxleas Wood, and likewise in 1982 by Pitt, who commented that it was to be found 'especially along ditches and paths where the woodland is more open'.

Cow parsley *Anthriscus sylvestris:* common in Oxleas Wood and on the golf course and Eltham Common.

Ground elder *Aegopodium podagraria:* locally common and also recorded from tetrads covering Shooters Hill in Burton (1983).

Fool's parsley *Aethusa cynapium:* a common garden weed on the built-up north-west slopes of the Hill.

Wild angelica *Angelica sylvestris:* not noted by me, but reported in 1982 by Pitt and Bale in the alder–willow area of Oxleas Wood. The former also found it growing in the damper parts of Eltham Common and along a ditch in Jackwood.

Wild parsnip *Pastinaca sativa:* plentiful on the golf course.

Hogweed *Heracleum sphondylium:* common, especially on the golf course.

Wild carrot *Daucus carota:* frequent on the golf course.

White bryony *Bryonia dioica:* frequent on the golf course.

Dog's mercury *Mercurialis perennis:* common.

Annual mercury *M. annua:* common garden weed on the Hill.

Sun spurge *Euphorbia helioscopia:* locally common, especially in the vicinity of the golf course.

Petty spurge *E. peplus:* common weed on the cultivated parts of the Hill, particularly in gardens.

Wood spurge *E. amygdaloides:* frequent, especially on the golf course. In 1982 Pitt noted it as occasional in Jackwood, Oxleas Wood and on Eltham Common.

Knotgrass *Polygonum aviculare:* common in cultivated areas and on disturbed ground.

Redleg *P. persicaria:* locally frequent.

Black bindweed *P. convolvulus:* common in cultivated areas, particularly on the north side of the Hill.

Sheep's sorrel *Rumex acetosella:* locally common on the golf course. Also present in the acid grassland in the Memorial Hospital grounds (Swales *et al.*).

Common sorrel *R. acetosa:* common in suitable habitat.

Curled dock *R. crispus:* common wherever habitat suitable.

Broad dock *R. obtusifolius:* as *R. crispus.*

Wood or **red-veined dock** *R. sanguineus:* noted by me in lank grassland at the edge of the golf course, near Woodlands Farm. Recorded in the Shooters Hill area in the 1965-76 LNHS survey (Burton 1983).

Small nettle *Urtica urens:* common in the cultivated areas and also recorded in the LNHS survey (Burton 1983).

Stinging nettle *U. dioica:* widespread and common.

Wych elm *Ulmus glabra:* a few on the northern slopes of the Hill.

Common elm *E. procera:* a few on the golf course and northern slopes of the Hill. Not noted by me, Bale or Pitt in the southern woodlands.

Silver birch *Betula pendula:* the commonest of the two birches found on Shooters Hill. Pitt aptly sums up the status of this and the downy birch *B. pubescens* as 'scattered throughout the woodland (Eltham Common, Jackwood, Oxleas and Shepherdleas Woods) and locally common, with hybrids between them'. Bale's survey in 1982 describes the distribution of both species in Oxleas Wood, Shepherdleas Wood and Jackwood in detail. Also present in the woods on and around the golf course (Swales *et al.*).

Downy birch *B. pubescens:* see silver birch above.

Alder *Alnus glutinosa:* as reported by Pitt and surveyed in detail by Bale, there is an area of alder wood in the north-east corner of Oxleas Wood, some of which they thought may have been planted, as also a few trees bordering a ditch in Jackwood.

Hornbeam *Carpinus betulus:* noted by me as a locally frequent tree in Oxleas Wood and occasional in Castlewood, Jackwood and on Eltham Common. Pitt reported it as local in Oxleas Wood, while the extensive and detailed survey in 1982 by Bale showed it to be occasional (considered planted) to locally dominant (most believed to be natural) with pedunculate oak in Oxleas Wood and rare (considered planted) in Jackwood. Also present in the woods on the north side of the Hill, including some derelict coppice (Swales *et al.*).

Hazel *Corylus avellana:* locally common on the heavily wooded southern slopes of the hill, especially in Oxleas and Shepherdleas Woods, and frequent in the wood fragments on the northern slopes. Pitt noted that there are old coppice stools throughout the lower parts, especially in Oxleas Wood, and thought that originally hazel was more common. In his extensive 1982 survey, Bale also thought that much hazel had been lost through shrub clearance, especially in Jackwood.

Beech *Fagus sylvatica:* noted by me as frequent on Shooters Hill as a whole, but the detailed 1982 survey by Bale reported it as a rare tree in the southern woodlands, almost certainly always planted. Pitt noted 'occasional seedlings, probably from planted trees'.

Sweet chestnut *Castanea sativa:* locally frequent to abundant in Castlewood, Jackwood, Oxleas Wood and Shepherdleas Wood. As pointed out by Pitt and Bale, as a result of their surveys, this tree was formerly coppiced in the lower part of Oxleas Wood and also in the higher parts of Castlewood and Jackwood, where Pitt noted large standard trees. Milner mentions that some clear-felling of standard trees took place in the nineteenth century and that planting of sweet chestnut in this area took place as early as the Roman period.

Turkey oak *Quercus cerris:* not noted by me, but occasional, planted trees in Oxleas Wood reported by Pitt and Bale as seeding.

Pedunculate oak *Q. robur:* noted by me as common. The extensive surveys by Pitt and Bale have shown that it is the dominant tree on the clays, and that it has been coppiced in the past in the south-west part of Jackwood and on Eltham Common. Bale described part of Oxleas and Shepherdleas Woods as well-formed oak woodland with a mature canopy, canopy recruitment, and good shrub and herb layers, some of it natural and the rest originally planted. Jackwood he described as a woodland of oak stands, most of it a hybrid between *Quercus petraea* and *Q. robur*, but with *petraea* occurring in the upper, northern areas of the wood and *robur* in the remainder. The woodland fragments on the northern slopes (i.e., the golf course) also contain much *robur*, especially Clothmakers Wood.

Sessile oak *Q. petraea:* noted by me as locally common. The surveys by Pitt and Bale showed that woodland dominated by this species, plus a good proportion of *petraea* × *robur*, occurs in the upper parts of Jackwood, Oxleas Wood and Eltham Common, but occasional sessile oaks can be found scattered throughout.

Aspen *Populus tremula:* noted by me, Pitt and Bale as occasional in the damper woodland areas on the southern side of the Hill, particularly in Oxleas Wood.

Black poplar *P. nigra:* occasional planted trees on the northern side of the Hill.

Lombardy poplar *P. nigra* var. *italica:* many planted on the golf course, mainly near Woodlands Farm.

Black Italian poplar *P.* × *canadensis:* occasional planted trees on the northern side of the Hill.

Crack willow *Salix fragilis:* not noted by me, but reported by Pitt from the vicinity of the old pond areas on Eltham Common and in Oxleas Wood.

Goat willow *S. caprea:* occasional throughout the woodlands and woodland fragments of the Hill, as also noted by Pitt and Bale. Frequent on western margin of Eltham Common (Swales *et al.*).

Grey willow (common sallow) *S. cinerea* ssp. *oleifolia:* noted by me as locally frequent in the 1940s-1950, but subsequently much more precisely surveyed by Pitt and Bale, who found it to be an occasional species throughout the damper parts of Oxleas and Shepherdleas Woods and on Eltham Common, and especially abundant in the alder area around the 'Winter Pond' in the extreme south of Oxleas Wood.

Eared sallow *S. aurita:* reported from Eltham Common and Shooters Hill at the turn of the century by Wolley-Dod no less (Grinling *et al.*), so there was presumably no confusion with *S. cinerea*.

Creeping willow *S. repens:* West (1906) bred the small chocolate-tip moth *Clostera pigra* from females obtained on this species, probably in the former West Wood. There are no other records of *repens* on the Hill.

Rhododendron *Rhododendron ponticum:* widely planted and established by the 1940s in Castlewood, Jackwood and Oxleas Wood. This was still the situation in the 1980s, as reported by Pitt and Bale. The former noted that this shrub was still being planted.

Primrose *Primula vulgaris:* frequent in Oxleas Wood.

Yellow pimpernel *Lysimachia nemorum:* I have no note of having seen this plant on Shooters Hill, but Pitt recorded it in 1982 growing along a ditch in Jackwood.

Creeping jenny *L. nummularia:* recorded on Shooters Hill in 1836 (Grinling *et al.*), but not subsequently.

Scarlet pimpernel *Anagallis arvensis:* locally common in suitable habitat.

Buddleia *Buddleia davidii:* frequent in and around gardens and on waste ground.

Ash *Fraxinus excelsior:* recorded by me as frequent and by Bale in 1982 as locally frequent or abundant in Oxleas Wood and Shepherdleas Wood. In Oxleas Wood his 1982 survey noted stands of ash, some of which he considered may have been planted, others more likely to be natural; also that some of the trees had been coppiced. Pitt noted that ash trees were present along the old hedge boundary between Oxleas Wood and Oxleas Meadow. Also frequent in woods and hedges on the north side of the Hill.

Lesser periwinkle *Vinca minor:* reported from Castlewood in 1836 (Grinling *et al.*) but not since.

Jacob's ladder *Polemonium caeruleum:* reported in 'great abundance' in Shooters Hill Wood in 1793 (Grinling *et al.*). Not seen since.

Common comfrey *Symphytum* × *uplandicum:* frequent on dry waysides on the open slopes of the Hill.

Green alkanet *Pentaglottis sempervirens:* frequent on the northern slopes of the Hill.

Field bindweed *Convolvulus arvensis:* common on cultivated and waste ground, especially on the northern slopes of the Hill.

Great bindweed *Calystegia sepium:* both subspecies, *sepium* and *silvatica*, were common in the 1940s and 1950s.

Duke of Argyll's tea-tree *Lycium halimifolium:* recorded by J. F. Bevis 'in a hedge at the top of Shooters Hill' in 1906 (Grinling *et al.*).

Deadly nightshade *Atropa belladonna:* frequent on the golf course roughs in the 1940s and early 1950s.

Bittersweet *Solanum dulcamara:* common on the golf course and locally elsewhere on the Hill. Pitt found it in the alder swamp in Oxleas Wood and in the old pond areas.

Black nightshade *S. nigrum:* common in the cultivated areas, especially on the northern side of the Hill.

Common mullein *Verbascum thapsus:* although I have no personal records of this plant in the 1940s and 1950s, it apparently used to occur as a hybrid with the white mullein *V. lychnitis* as reported from Castlewood in 1836 (Grinling *et al.*).

White mullein *V. lychnitis:* reported from Shooters Hill in 1746 (Grinling *et al.*), but not, I believe, since then, except as a hybrid with *V. thapsus.*

Moth mullein *V. blattaria:* reported from Shooters Hill in 1838 (Grinling), but apparently not since.

Common toadflax *Linaria vulgaris:* locally plentiful; mainly on the northern slopes. In Burton (1983) it is shown occurring in all the tetrads covering Shooters Hill.

Ivy-leaved toadflax *Cymbalaria muralis:* common on old walls.

Common figwort *Schrophularia nodosa:* occasional, particularly in the woodland fragments of the golf course. Noted by Bale as rare in Oxleas and Shepherdleas Woods.

Foxglove *Digitalis purpurea:* frequent in the southern woods and on the golf course on the north side. Noted without comment by Pitt.

Heath speedwell *Veronica officinalis:* not noted by me or Bale and Pitt, but recorded from a tetrad covering Shooters Hill (Burton 1983).

Germander speedwell *V. chamaedrys:* common on the golf course and in clearings in Oxleas Wood adjoining Oxleas Meadow. Noted by Pitt without comment on frequency.

Wall speedwell *V. arvensis:* frequent in suitable habitats, particularly in the golf course and Woodlands Farm area. Not noted by Bale or Pitt, but recorded from a tetrad covering Shooters Hill (Burton).

Common field speedwell *V. persica:* common on suitable open ground, especially on the northern slopes. Not noted by Bale or Pitt, but recorded from the tetrads covering Shooters Hill (Burton).

Common cow-wheat *Melampyrum pratense:* common on Eltham Common in the 1940s and 1950s, where reported as locally abundant in one area of open woodland by Pitt.

Greater broomrape *Orobanche rapum-genistae:* recorded on Shooters Hill by Gerarde (1597) as early as 1587, but apparently not subsequently. Burton (1983) stated that it has not been seen in the London area since the early 1900s.

Water-mint *Mentha aquatica:* not found by me, but Pitt reported it as rare in a ditch in Jackwood.

Self-heal *Prunella vulgaris:* locally common; also recorded by Pitt without comment on its status.

Marsh woundwort *Stachys palustris:* not recorded by me, Bale or Pitt, but recorded from a tetrad covering Shooters Hill (Burton). Present in Oxleas Wood in 1969, but reported by Mrs M. C. Foster as not there in 1973 (R. M. Burton *in litt.*).

Hedge woundwort *S. sylvatica:* common on the golf course; not apparently noted by Bale or Pitt, but recorded from tetrads covering the Hill (Burton).

Black horehound *Ballota nigra:* common in suitable habitats; recorded from all tetrads covering Shooters Hill (Burton).

Yellow archangel *Galeobdolon luteum:* common on the golf course. More recently recorded from open woodland on Eltham Common by Pitt.

Henbit *Lamium amplexicaule:* frequent in the cultivated areas; recorded from all tetrads covering Shooters Hill (Burton).

Red dead-nettle *L. purpureum:* common in many places.

White dead-nettle *L. album:* common in suitable places, especially on the golf course and Eltham Common, and in Oxleas Meadow. Also recorded by Pitt.

Common hemp-nettle *Galeopsis tetrahit:* not noticed by me, but recorded from one of the tetrads covering Shooters Hill in Burton (1983).

Ground ivy *Glechoma hederacea:* abundant on the golf course and common in Oxleas Wood and along the adjacent edges of Oxleas Meadow. Noted without comment on status by Pitt, while Bale notes it as occasional to frequent in Oxleas Wood.

Wood sage *Teucrium scorodonia:* common in Oxleas Wood, Shepherdleas Wood, Jackwood, Castlewood and on Eltham Common and the golf course. More recently

Pitt recorded it as widespread along paths and ditches throughout the wooded southern slopes and on more open areas on pebble beds. Bale also reported it as occasional to frequent in Oxleas Wood, Shepherdleas Wood and Jackwood.

Bugle *Ajuga reptans:* locally common in Oxleas Wood and the other woodlands on the southern slopes; common on the golf course on the north-east side of the Hill. In 1982 noted by Pitt as occasional to locally common along ditches and in damper areas of woodland on the south side of the Hill.

Greater plantain *Plantago major:* common in suitable habitats.

Ribwort plantain *P. lanceolata:* common, as also in more recent times (Pitt).

Harebell *Campanula rotundifolia:* frequent on the golf course.

Hedge bedstraw *Galium mollugo:* locally common.

Lady's bedstraw *G. verum:* locally common (e.g., Oxleas Meadow, Castlewood, Jackwood and the golf course).

Heath bedstraw *G. saxatile:* frequent in the acid grassland in the Memorial Hospital grounds (Swales *et al.*).

Fen bedstraw *G. uliginosum:* reported from Shooters Hill in 1899 (Grinling *et al.*) as well as from Blackheath and Hanging Wood, Charlton in 1793.

Goosegrass *Galium aparine:* locally abundant.

Elder *Sambucus nigra:* widespread, but thinly distributed and only locally frequent, as it still is today.

Wayfaring tree *Virburnum lantana:* I noted a few examples of this species on the golf course in the 1940s and 1950s, but not elsewhere. However, Pitt notes it as 'scattered – very local' in the woodlands on the southern slopes.

Guelder rose *V. opulus:* I considered this species to be frequent on the golf course as well as in the woodlands on the southern slopes where Pitt and Bale noted it as occasional, but widespread in the damper areas.

Honeysuckle *Lonicera periclymenum:* frequent in all the woodlands of Shooters Hill as is still the case nowadays.

Small teasel (shepherd's rod) *Dipsacus pilosus:* there is a record of this rare species growing in a lane between Plumstead and Shooters Hill in 1793 (Grinling *et al.*).

Field scabious *Knautia arvensis:* frequent on the golf course.

Devil's-bit scabious *Succisa pratensis:* overlooked by me, but found by Pitt in the open woodland area of Eltham Common together with common cow-wheat and wood sage.

Trifid bur-marigold *Bidens tripartita:* recorded in 1905 on Eltham Common (Grinling *et al.*), presumably at the edge of one of the old ponds, but not since.

Common ragwort *Senecio jacobaea:* common, especially in the golf course area.

Hoary ragwort *S. erucifolius:* not noticed by me, but recorded in one of the tetrads covering Shooters Hill in Burton (1983).

Oxford ragwort *S. squalidus:* common, especially in the golf course area.

Groundsel *S. vulgaris:* common.

Plantain-leaved leopard's-bane *Doronicum plantagineum:* Grinling includes a record from 1848 of this plant having been abundant in a wood 'at the back of Shooter's Hill'.

Coltsfoot *Tussilago farfara:* common in suitable habitats.

Winter heliotrope *Petasites fragrans:* not found by me, although it was recorded from Shooters Hill by Wolley-Dod and from the neighbourhood of Severndroog Castle in Castlewood in 1907 by J. F. Bevis (Grinling *et al.*).

Golden-rod *Solidago virgaurea:* not noticed by me or Pitt, but recorded in 1920 (Kent and Lousley 1951-7) and in 1982 as occasional in the more natural pedunculate oak-hazel woodland areas of Oxleas Wood by Bale. In the no longer existing West Wood, West (1906) used to find the larvae of the star-wort moth *Cucullia asteris* on this plant.

Canadian fleabane *Conyza canadensis:* common on waste ground.

Common daisy *Bellis perennis:* common in grassy places, particularly on the golf course.

Sneezewort *Achillea ptarmica:* first recorded from Shooters Hill in 1877 and subsequently on Eltham Common in 1903 (Grinling *et al.*). Not noticed by me, but seen in Oxleas Wood in 1983 by Pitt and recorded from the tetrad covering Eltham Common in Burton (1983).

Yarrow *A. millefolium:* common in grassy places and wasteland as also reported by Pitt.

Scentless mayweed *Tripleurospermum maritimum:* common on wasteland.

Pineapple weed *M. matricarioides:* frequent on disturbed and trampled earth.

Ox-eye daisy *Chrysanthemum leucanthemum:* plentiful on the golf course.

Feverfew *C. parthenium:* frequent in Oxleas Meadow and on the fringes of the golf course.

Mugwort *Artemisia vulgaris:* common on waste ground.

Burdock *Arctium minus:* common in suitable habitats. Recorded from tetrads covering Shooters Hill in Burton.

Spear thistle *Cirsium vulgare:* common in suitable habitats.

Marsh thistle *C. palustre:* frequent, especially on the lower slopes of the golf course.

Creeping thistle *C. arvense:* common.

Black or **lesser knapweed** *Centaurea nigra:* common on the golf course. Not mentioned by Bale or Pitt, but recorded from the tetrads covering Shooters Hill in Burton.

Nipplewort *Lapsana communis:* frequent; also recorded by Pitt without comment on its status.

Common cat's-ear *Hypochoeris radicata:* common, especially on the golf course. Frequent in the acid grassland of the Memorial Hospital (Swales *et al.*). Also recorded by Pitt without comment on status.

Autumn hawkbit *Leontodon autumnalis:* common on the golf course. More recently recorded in the tetrads covering Shooters Hill in Burton.

Greater hawkbit *L. hispidus:* frequent on the golf course.

Hawkweed ox-tongue *Picris hieracioides:* frequent on the golf course. More recently recorded from a tetrad covering Shooters Hill in Burton.

Goat's-beard *Tragopogon pratensis:* frequent on the golf course; also recorded more recently from tetrads covering Shooters Hill in Burton.

Wall lettuce *Mycelis muralis:* frequent on the golf course.

Smooth sow-thistle *Sonchus oleraceus:* locally common.

Prickly sow-thistle *S. asper:* common.

Hawkweeds *Hieracium* spp.: common, especially on the golf course. On 12 October 1958 I considered several 'clumps' in flower in Oxleas Wood to be *H. perpropinquum*, while Pitt thought that the species she found to be widespread throughout the woodland complex on the southern slopes of the Hill might be *H. umbellatum*.

Mouse-ear hawkweed *H. pilosella:* common on the golf course and occasionally noted in Oxleas Meadow and on Eltham Common. Frequent in the acid grassland of the Memorial Hospital grounds (Swales *et al.*). More recently, it has been recorded in tetrads covering Shooters Hill in Burton.

Beaked hawk's-beard *Crepis vesicaria:* common on the golf course; also recorded in the tetrads covering Shooters Hill in Burton.

Smooth hawk's-beard *C. capillaris:* as previous species.

Dandelion *Taraxacum officinale:* abundant.

Butcher's broom *Ruscus aculeatus:* frequent in Jackwood and Oxleas Wood in the 1940s and 1950s. Recorded from Crown Woods in 1907 (Grinling *et al.*). Recently Pitt and Bale have reported it as rare in the middle of Oxleas Wood, and in Shepherdleas Wood and Jackwood.

Autumn squill *Scilla autumnalis:* reported in 1793 from a lane between Shooters Hill and Plumstead (Grinling *et al.*). Now extinct.

Bluebell *Endymion nonscriptus:* common in Castlewood, Jackwood and Oxleas Wood, and also in small woods on the golf course. Still common today (Pitt 1982, Milner 1988). Present on Eltham Common (Swales *et al.*).

Meadow saffron *Colchicum autumnale:* reported in 1836 from fields between Plumstead Common and Shooters Hill (Grinling *et al.*). Much of the western part of these fields has long been supplanted by the Shooters Hill Golf Course. No doubt the long-vanished stands of *Colchicum* near Plumstead mentioned by Burton (1983) were part of this population.

Soft rush *Juncus effusus:* not recognized by me, but found by Pitt in the old pond areas close to the Falconwood exit of Oxleas Wood and also at the old pond on Eltham Common, as well as occasionally in the damper parts of Jackwood and Oxleas Wood.

Compact rush *J. conglomeratus:* reported from Shooters Hill as early as 1666 (Grinling *et al.*). Not recognized by me, but recorded in a tetrad covering the Hill by Burton.

Hairy wood-rush *Luzula pilosa:* fairly frequent in the woods on the southern slopes and in the woodland fragments on the golf course. Pitt recorded it as occasional along ditches and paths throughout the southern woodlands.

Southern or **narrow-leaved wood-rush** *L. forsteri:* recorded by me in the 1940s and 1950s as frequent in Oxleas Wood and Meadow. More recently Pitt noted it to be rare in the south-western part of Oxleas Wood with two or three plants on Eltham Common as well.

Field wood-rush *L. campestris:* common in grassy areas, such as Oxleas Meadow and the golf course. Apparently still so (Pitt). Present in the acid grassland of the Memorial Hospital grounds (Swales *et al.*).

Snowdrop *Galanthus nivalis:* frequent in Jackwood and Oxleas Wood; presumably planted long ago.

Daffodil *Narcissus pseudonarcissus:* plentiful in Oxleas Wood and Jackwood, and noted to be still so on my visit to the latter wood on 3 March 1984. Some of these at least may be relics of former native populations as Burton (1983) considers that those in Lesnes Abbey Wood, about 4 km to the ENE, are 'certainly native'.

Black bryony *Tamus communis:* occasional on the golf course. Recorded from tetrads covering Shooters Hill in Burton.

Wild arum (cuckoo pint) *Arum maculatum:* recorded by me as frequent in the hedgebanks and woodlands of Shooters Hill, but more recently by Pitt as occasional.

Common duckweed *Lemna minor:* noted by me in 1946 in a pond in Castlewood and in another pond on the golf course, 1947-8.

Wood sedge *Carex sylvatica:* not recognized by me, but reported by Pitt to be widespread in the southern woodlands, particularly along paths and ditches.

Drooping sedge *C. pendula:* noted by me in Oxleas Wood, but without details. Pitt and Bale reported it as present in small quantity in the alder/willow area of Oxleas Wood.

Prickly sedge *C. muricata:* reported from Shooters Hill by Wolley-Dod early in this century (Grinling *et al.*).

Star sedge *C. echinata:* reported from Eltham Common by Wolley-Dod in the early years of this century (Grinling *et al.*), but apparently not since.

Remote sedge *C. remota:* not recognized by me, but reported by Pitt to be occasional along ditches and locally abundant in the woodlands on the southern slopes of the Hill. Also recorded from all tetrads covering Shooters Hill in Burton.

Oval sedge *C. ovalis:* reported from Shooters Hill in 1877 (Grinling *et al.*), but not subsequently.

Sweet grass *Glyceria plicata:* not recognized by me, but recorded in abundance in 1982 from the 'winter pond' in the southern part of Oxleas Wood by Bale.

Small flote-grass *G. ?declinata: Glyceria*, possibly of this species, reported by Pitt from the 'old pond areas close to the Falconwood exit' of Oxleas Wood (presumably Bale's 'winter pond' and therefore possibly *G. plicata* is actually the species involved), and from the old pond on Eltham Common.

Giant fescue *Festuca gigantea:* reported as frequent around the 'winter pond' in the south of Oxleas Wood by Bale. Pitt also mentions it in Oxleas Wood without comment on its status.

Red fescue *F. rubra:* reported from Eltham Common by Wolley-Dod in 1894 (Grinling *et al.*). Common on the golf course and other grassy places. Also listed by Pitt without comment. Reported to be a dominant species in the acid grassland of the Memorial Hospital grounds (Swales *et al.*).

Sheep's fescue *F. ovina:* frequent on the golf course; also listed by Pitt from the southern slopes without comment on its status.

Perennial rye-grass *Lolium perenne:* locally common.

Annual meadow-grass *Poa annua:* locally common.

Wood meadow-grass *P. nemoralis:* common; also listed by Pitt without comment and recorded from tetrads covering Shooters Hill in Burton.

Rough meadow-grass *P. trivialis:* as *P. nemoralis.*

Smooth meadow-grass *P. pratensis:* frequent in suitable habitats. Subspecies *pratensis* is recorded from tetrads covering Shooters Hill in Burton.

Cock's-foot grass *Dactylis glomerata:* widespread and common in suitable habitats.

Crested dog's-tail *Cynosurus cristatus:* locally frequent, such as on the golf course. Not listed by Pitt, but recorded from one of the Shooters Hill tetrads in Burton.

Wood melick *Melica uniflora:* frequent, also listed by Pitt without comment and recorded from one of the Shooters Hill tetrads in Burton. Recently reported from the golf course by Swales *et al.*

Hairy brome *Zerna ramosa (= Bromus ramosus):* not recognized by me nor listed by Pitt, but recorded from a tetrad covering Shooters Hill in Burton.

Soft brome *Bromus mollis* agg.: locally frequent. Not listed by Pitt, but recorded from tetrads covering Shooters Hill in Burton.

Slender false-brome *Brachypodium sylvaticum:* widespread and common in the woodlands in the 1940s and 1950s as also recently reported by Pitt.

Common couch *Agropyron (= Elymus) repens:* common.

Meadow barley *Hordeum secalinum:* frequent, particularly on the northern slopes. More recently (Burton 1983) recorded from tetrads covering Shooters Hill.

Wall barley *H. murinum:* as *H. secalinum.*

Yellow oat-grass *Trisetum flavescens:* not noticed by me, but recorded from one of the Shooters Hill tetrads in Burton.

Wild oat *Avena fatua:* as *T. flavescens.*

False oat-grass *Arrhenatherum elatius:* widespread and locally common. More recently reported by Pitt as common in disturbed areas and along the edges of the southern woodlands as well as in grassland.

Yorkshire fog *Holcus lanatus:* widespread and locally common. Also listed by Pitt without comment.

Creeping soft-grass *H. mollis:* as *H. lanatus.*

Tufted hair-grass *Deschampsia cespitosa:* locally common, as more recently noted by Pitt.

Wavy hair-grass *D. flexuosa:* not found by me, but reported by Swales *et al.* to be present in the acid grassland of the Memorial Hospital grounds adjacent to Jackwood.

Early (small) hair-grass *Aira praecox:* as last species, where it is reported to be among the dominant grass species.

Common bent *Agrostis tenuis (= capillaris):* plentiful on the golf course and in Oxleas Meadow. Pitt notes it as occurring in the 'higher parts' and in Oxleas Meadow, while Swales *et al.* report it to be a dominant grass in the Memorial Hospital grounds.

Black bent *A. gigantea:* not noticed by me, but reported by Pitt as occasional in Oxleas Wood.

Creeping or **white bent** *A. stolonifera:* frequent, especially on the golf course, and considered by Pitt to be still widespread on the southern slopes.

Smaller cat's-tail *Phleum bertolonii:* frequent on the golf course. More recently recorded from Shooters Hill tetrads in Burton.

Timothy grass *P. pratense:* locally frequent on the northern slopes.

Meadow foxtail *Alopecurus pratensis:* frequent on the golf course. Recently recorded from tetrads covering Shooters Hill in Burton.

Wood millet *Milium effusum:* first reported from Shooters Hill by Wolley-Dod at the turn of the century (Grinling *et al.*). Frequent in Castlewood and Jackwood; also more recently recorded as occasional or frequent in Jackwood and Shepherdleas Wood by Bale and on the golf course by Swales *et al.*

Sweet vernal grass *Anthoxanthum odoratum:* widespread and common as also reported by Pitt.

Comments

It will be seen from the foregoing that 311 species have been recorded on Shooters Hill as far back as records exist, 282 of them since 1943. No doubt others remain to be found. Meanwhile, this total may be compared with approximately 150 species reported in the 1980s from Oxleas Wood and the adjacent woods and Eltham Common by Curry (1986), Pitt (1982), Pretty (1986) and Watts (1986), as quoted in Milner (1988).

Mammals

Nomenclature follows Corbet and Southern (1977). As with the preceding systematic plant list, my assessment of the status of each species for the period 1943-58 appears first, except when earlier records are given or I have none of my own. Again I have not attempted an exhaustive search of the literature, either for 1943-58 or subsequently, but where I have other information to hand it is given with sources.

Hedgehog *Erinaceus europaeus:* frequently seen, especially in Oxleas Wood. I have personal sightings from the years 1946, 1948 and 1958. In the last year, on 12 October, I photographed one walking at a remarkably fast speed along a path in Oxleas Wood in broad daylight. In 1962 Teagle (1965) received records of the occurrence of hedgehogs at Eltham Park and Falconwood on the southernmost fringe of Shooters Hill.

Mole *Talpa europaea:* molehills frequently seen on the golf course.

Common shrew *Sorex araneus:* recorded from Shooters Hill in 1859 (Grinling *et al.* 1909). Seen by me on Eltham Common in 1946 and in Oxleas Wood in 1948 and 1958, and also by Milner (1988) in the latter location. Probably quite common.

Noctule *Nyctalus noctula:* recorded in Oxleas Wood by the London Bat Group (Mickleburgh 1987).

Pipistrelle *Pipistrellus pipistrellus:* I watched several, believed to be of this species, hunting moths around sallow blossom and electric lamps in Jackwood and Oxleas Wood in March and April 1948. Also recorded using Oxleas Wood as a feeding area by Mickleburgh (1987).

Rabbit *Oryctolagus cuniculus:* generally plentiful on Shooters Hill, including Castlewood, Jackwood, Oxleas Meadow and Wood, and the golf course from 1943 to at least 1949. At the time when myxomatosis struck, 1954 onwards, I was living in Oxford and did not visit Shooters Hill. However, I never saw any more there on my return to my south-east London home in 1958.

Grey squirrel *Sciurus carolinensis:* present in small numbers in Jackwood and Oxleas Wood. Maximum I saw together was eight in Oxleas Meadow, 12 December 1946. In 1962 this squirrel was reported from Eltham Common and all the woods on Shooters Hill (Teagle 1965).

Field vole *Microtus agrestis:* plentiful and widespread, including Oxleas Wood and the golf course. In May 1948 I found the remains of one in a kestrel pellet on the golf course.

Wood mouse *Apodemus sylvaticus:* plentiful throughout, including the golf course, where on 9 May 1947 I watched several feeding in broad daylight amongst brambles and bluebells at the edge of a small wood. Recently Milner (1988) has observed this species in Oxleas Wood.

Common rat *Rattus norvegicus:* almost certainly occurs, but never seen by me on the Hill.

Fox *Vulpus vulpes:* resident in small numbers in the woodlands on the southern slopes and on the golf course. As mentioned by Teagle (1967), I once watched, one evening in 1944, a fox walking up Shooters Hill Road towards Jackwood in full view of some other human passers-by who, in the fading light, probably thought it was a dog. Teagle also mentions one heard on Shooters Hill by R. G. Rigden in March 1953. The latest note I have in my journal is of one I disturbed on 6 February 1949 from a bramble thicket on a bank of the stream flowing between Woodlands Farm and the golf course.

Weasel *Mustela nivalis:* occasionally seen on the golf course.

Polecat *M. putorius:* according to the *Fauna of Blackheath*, published in 1859 and cited by Tutt in Grinling *et al.*, this species formerly occurred in Crown and West Woods on the eastern side of Shooters Hill.

Reptiles and Amphibians

Nomenclature follows that used by Yalden (1965).

Common (smooth) newt *Triturus vulgaris:* numerous in a pond on the golf course, 9 May 1947.

Palmate newt *T. helveticus:* five in a pond on the golf course, 9 May 1947.

Crested newt *T. cristatus:* plentiful in the same pond on the golf course as *T. vulgaris* and *T. helveticus* on 9 May 1947 and in 1948.

Common frog *Rana temporaria:* frequently reported in the vicinity of the ponds and damper areas generally.

Common toad *Bufo bufo:* frequently reported.

Slow-worm *Anguis fragilis:* probably present during the period under review as specimens were recorded as close as Plumstead Common and Bostall Heath by Rigden (1955), but I have had no sightings of my own.

Grass snake *Natrix natrix:* occasionally seen on the golf course in the 1940s.

Birds

Nomenclature follows that of *The 'British Birds' List of birds of the western Palearctic* as used in the *London Bird Report* for 1990. As with the previous groups, the assessment of status for 1943-58 is mine, and earlier and later information is given where available to me, but I have not made an exhaustive search of the *London Bird Report* or other literature subsequent to Homes *et al.* (1957). Records taken from Bale (1986), Bealey (1986), *Fauna of Blackheath* (1859) in Grinling *et al.* (1909), Homes *et al.* (1957), Newton (1986) and Pye-Smith (1983) are all simply referred to hereafter by name only.

Sparrowhawk *Accipter nisus:* one pair at least known or believed to have nested – on one occasion 10 metres up in an oak – in Oxleas Wood from 1944 to 1951, and possibly subsequently. On 12 December 1946, in Oxleas Wood, I saw a female stoop unsuccessfully at a brambling, while in the same locality on 13 April 1947 D. F. Owen watched a male pursuing a party of 12 redpolls. Elsewhere on the Hill, I have seen sparrowhawks on Eltham Common (1946), in Castlewood (1947 and 1949), in Jackwood (1949) and on the golf course (1949).

Kestrel *Falco tinnunculus:* at least one pair nested annually on the golf course from 1946 to at least 1949; in 1947 and 1948 three young successfully flew. Kestrels were also watched regularly hunting over Oxleas Meadow from 1943 to 1949, and it is possible that a second pair may have nested in this area, although it is more likely that they came from the golf course.

Hobby *F. subbuteo:* one pair was present on the golf course in 1946 and was believed to have nested in the nearby part of Oxleas Wood. In May 1947, on four different dates, D. F. Owen and I observed up to four birds (two pairs?) on the golf course: for example, on 11 May D.F.O. saw two pairs at close quarters in the former prisoner-of-war camp area, and on 20 May K. H. Hyatt and D.F.O. watched a pair displaying and causing considerable disturbance among the smaller birds, while on 27 May I watched three in what seems to have been an aerial territorial encounter. This site, incidentally, is the unnamed north Kent locality referred to in the *London Bird Report* for 1946 and 1947.

Grey partridge *Perdix perdix:* up to seven pairs nested annually from 1946 to at least 1950 on the golf course or the adjacent Woodlands Farm. For instance, on 16 June 1947 D. F. Owen saw a pair with a brood of newly-hatched chicks. In autumn and winter, coveys of six to 12 were regularly seen.

Pheasant *Phasianus colchicus:* several present in Jackwood, Oxleas and Shepherdleas Woods until at least 1950. Grinling *et al.* reported that pheasants were fairly common in the nineteenth century in Crown and West Woods (Shooters Hill), according to the *Fauna of Blackheath.*

Lapwing *Vanellus vanellus:* usually small flocks occasionally seen flying over Shooters Hill outside the breeding season.

Woodcock *Scolopax rusticola :* occasionally reported in late autumn or winter. Recently, Bale saw this species during his vegetation survey of Jackwood and Oxleas Wood in the late autumn of 1982.

Black-headed gull *Larus ridibundus:* often numerous outside the breeding season, especially in winter, on the golf course and Woodlands Farm. Also seen flying over Oxleas Meadow and the adjacent woodlands.

Common gull *L. canus:* at times almost as numerous in winter as the last species on the golf course and Woodlands Farm, or flying over the adjacent woodlands.

Lesser black-backed gull *L. fuscus:* occasionally seen flying over or settled with the last two species on the golf course or Woodlands Farm.

Herring gull *L. argentatus:* as the last species, but more frequent.

Feral rock dove *Columba livia:* individuals or small flocks occur frequently, especially on Woodlands Farm.

Stock dove *C. oenas:* fairly numerous outside the breeding season, consorting with woodpigeons on the arable land of Woodlands Farm and roosting with them in Oxleas Wood. A few pairs bred in old trees on the golf course and in Oxleas Wood, and apparently still continue to do so, according to Bealey and Newton.

Woodpigeon *C. palumbus:* many pairs bred in Oxleas Wood, Jackwood and the other woods on Shooters Hill. Woodpigeons were often to be seen feeding in large flocks on the golf course and the arable land of Woodlands Farm, especially in the autumn and winter. Also noted in Jackwood, Oxleas Wood and Shepherdleas Wood in autumn 1982 by Bale, and by D. F. Owen and myself during visits in 1983 and 1984.

Collared dove *Streptopelia decaocto:* during the period 1943-58 this species had not yet, of course, reached Shooters Hill during its colonisation of England, but it was noted in and around Oxleas Wood in the late autumn of 1982 by Bale.

Cuckoo *Cuculus canorus:* Grinling *et al.* mention the occurrence of the cuckoo on Shooters Hill in 1903. It was certainly common enough in the 1940s, but less so in the late 1950s. For instance, in my journal for 13 May 1947 I noted that cuckoos 'could be heard everywhere and I often heard three at a time'. Again, on 6 May 1948, my journal records several on the golf course, including three pursuing each other, one of which uttered the bubbling cry as well as the familiar 'cuck-oo' call. Apart from the golf course, I have records of watching them in Jackwood and Oxleas Wood. My most recent record for this period was one in Oxleas Wood on 17 May 1958. Still considered by Bealey to breed in the latter locality.

Barn owl *Tyto alba:* reported from Shooters Hill in the early 1900s (Grinling *et al.*).

Little owl *Athene noctua:* in the years 1946-9 my records suggested that up to three pairs probably bred annually on Shooters Hill: one pair on the golf course, one pair in Oxleas Meadow or Oxleas Wood, and the third pair in the Eltham Common–Woolwich Common area. It is probable that at least a pair continued to breed in the 1950s, probably on the golf course.

Tawny owl *Strix aluco:* probably at least one pair nested annually in both Jackwood and Oxleas Wood. According to Bealey and Newton, several pairs are believed to breed annually on Shooters Hill nowadays.

Nightjar *Caprimulgus europaeus:* reported as a summer inhabitant of Shooters Hill in the 1850s (Grinling *et al.*). I know of no records this century.

Swift *Apus apus:* a report from 1904 mentions swifts occupying old house martins' nests at Shooters Hill. In the period 1943-58 several pairs at least nested under the eaves of the older houses on the north side of the Hill, and many were to be seen hunting aerial plankton (insects, etc.) over the golf course and the woodlands.

Green woodpecker *Picus viridis:* regularly seen and probably bred in Castlewood, Jackwood, Oxleas Wood, Shepherdleas Wood and on the golf course. Breeding was proved on the golf course in 1949 when two pairs nested successfully. This species was among birds noted by Bale during his autumn 1982 vegetation survey of Oxleas Wood.

Great spotted woodpecker *Dendrocopos major:* regularly seen and it is probable that at least a pair nested annually on the golf course and in each of the following woodlands: Castlewood, Jackwood, Oxleas Wood and Shepherdleas Wood. This was also among species noted in Oxleas Wood in 1982 by Bale.

Lesser spotted woodpecker *D. minor:* my only record was of one in Oxleas Wood on 6 June 1946. However, this species was not specifically looked for and was probably much overlooked by my friends and myself; it is likely that at least one pair nested annually in Oxleas Wood or the adjacent woodlands. In 1982 Bale noted this woodpecker among birds he saw during his vegetation survey, and Pye-Smith considered it to be 'plentiful' in the 1980s. Newton reported it to be breeding.

Woodlark *Lullula arborea:* reported in the last century as occurring on Shooters Hill (*Fauna of Blackheath*, quoted by Grinling *et al.*). I do not know of any records since then.

Skylark *Alauda arvensis:* until 1947, when the land was built over, several pairs bred annually in the locally-named 'Nine Fields' at Kidbrooke, just west of the Brook Hospital at the western foot of Shooters Hill. Several pairs also bred annually on the adjacent Woolwich Common up to at least 1958. One or two pairs also nested annually up to that year in rough grass on the golf course and Woodlands Farm, where small flocks were a frequent sight in autumn and winter.

Swallow *Hirundo rustica:* at least one pair nested annually on the golf course up to 1949 and probably later. Regularly seen in small parties on spring and autumn migration when they usually flew westwards.

House martin *Delichon urbica:* several pairs nested annually on houses on the north side of the Hill and were often seen hawking for flying insects over the golf course.

Tree pipit *Anthus trivialis:* one pair present and probably nested in 1949 on the site of the former POW camp on the golf course.

Meadow pipit *A. pratensis:* a regular autumn and winter visitor in small numbers to the golf course and Woodlands Farm.

Yellow wagtail *Motacilla flava flavissima:* occasionally seen on autumn passage in the golf course/Woodlands Farm area. In the 1940s, for example 1947, a few pairs nested regularly on nearby Woolwich Common and 4 km to the west at Blackheath.

Grey wagtail *M. cinerea:* occasional winter visitor to streams in the golf course/Woodlands Farm area.

Pied wagtail *M. alba yarrellii:* a few pairs nested annually, particularly in the golf course/ Woodlands Farm area, but also in Oxleas Wood where an ivy-covered wall was among sites used. Parties were frequent in the winter on the golf course and Woodlands Farm.

Wren *Troglodytes troglodytes:* reported as occurring on Shooters Hill in the early 1900s (Grinling *et al.*). A common resident in the 1940s and 1950s: on the golf course as well as in Oxleas Wood and all the other woodlands. Also noted by Bale in 1982 and by myself during brief visits on 31 August 1983 and 3 March 1984.

Dunnock *Prunella modularis:* a common resident on the golf course as well as in Jackwood, Oxleas Wood and all the other woodlands. I met with several in Jackwood and Oxleas Wood on 3 March 1984, including singing males.

Robin *Erithacus rubecula:* another common resident everywhere on Shooters Hill. In 1958 at least four pairs bred in Oxleas Wood alone. Noted in 1982 in Jackwood and Oxleas Wood by Bale and by me there on 3 March 1984.

Nightingale *Luscinia megarhynchos:* reported from Shooters Hill in the *Fauna of Blackheath* (1859) in Grinling *et al.*, but apparently not subsequently, although occasional individuals probably pass through on migration.

Redstart *Phoenicurus phoenicurus:* I saw a female, presumably on migration, in Castlewood on 28 April 1946.

Whinchat *Saxicola rubetra:* the only record known to me is of a male which sang during the period 16-31 May 1947 on Woolwich Common, a short distance from the western approaches to Shooters Hill (*LBR* for 1947).

Wheatear *Oenanthe oenanthe:* again the only record known to me is of two adults seen with three young on nearby Woolwich Common on 15 June 1947 (*LBR* for 1947, Homes *et al.* 1957). However, passage birds on open areas like the golf course may well have been overlooked.

Blackbird *Turdus merula:* common resident everywhere on the Hill, as was still the case on my visits of 31 August 1983 and 3 March 1984.

Fieldfare *T. pilaris:* a frequent winter visitor, especially to the golf course where flocks of up to 100 have been seen.

Song thrush *T. philomelos:* a common resident everywhere on the Hill in the 1940s and 1950s (e.g., several breeding pairs in Oxleas Wood in 1958), but appeared less so on my brief visits in 1983 and 1984. Among species seen by Bale in his autumn 1982 vegetation survey.

Redwing *T. iliacus:* common late autumn and winter visitor to the golf course, Woodlands Farm and the woodlands.

Mistle thrush *T. viscivorus:* resident in small numbers on the golf course and in Jackwood and Oxleas Wood.

Grasshopper warbler *Locustella naevia:* reported from Shooters Hill in the mid-nineteenth century (Grinling *et al.*), but I have not heard of any subsequent reports.

Lesser whitethroat *Sylvia curruca:* occasionally recorded on passage, but probably much overlooked and may have nested.

Whitethroat *S. communis:* a common summer resident in the 1940s and 1950s, especially on the golf course.

Garden warbler *S. borin:* an uncommon summer resident in the period 1943-58.

Blackcap *S. atricapilla:* a rather uncommon summer resident on Shooters Hill in the 1940s, but commoner in the following decade when, for instance, I recorded four singing males in Oxleas Wood alone in mid-May 1958.

Wood warbler *Phylloscopus sibilatrix:* reported from Shooters Hill in the mid-nineteenth century (Grinling *et al.*), but the only subsequent records I know of are of a pair I found in a small wood on the golf course in May 1947, which may have nested, and that Bealey suspected the species of breeding in Oxleas Wood.

Chiffchaff *P. collybita:* a common summer resident in the period under review in all the woodlands, including the small fragments on the golf course.

Willow warbler *P. trochilus:* as chiffchaff.

Goldcrest *Regulus regulus:* a few pairs appeared to breed annually in the woodlands until decimated by the severe winter of 1946-7. Subsequently, they recovered well and pairs were considered to have nested again in Jackwood and Oxleas Wood in the 1950s, one pair even as early as 1947. Frequent as a winter visitor, usually consorting with roving bands of titmice in all the woodlands. Among the species seen by Bale in his autumn 1982 vegetation survey.

Spotted flycatcher *Muscicapa striata:* a few pairs nested annually on the golf course and in Jackwood and Oxleas Wood. Bealey (1986) suspected this species of breeding in Oxleas Wood in more recent times.

Pied flycatcher *M. hypoleuca:* the only record known to me is the first-winter male I saw consorting with titmice in Jackwood on 17 November 1949, but more regular observations may reveal that this species is, in fact, quite regular on passage on Shooters Hill.

Long-tailed tit *Aegithalos caudatus:* although often large parties were frequently met with in autumn and winter in the woods on the south side of Shooters Hill from Castlewood to Oxleas Wood, breeding was not proved in the period 1943 to 1958. However, I suspected that a pair or two may have done so and Homes *et al.* indicated that breeding was believed to have taken place. Since then, long-tailed tits have become commoner in the area and during our brief visit on 31 August 1983 D. F. Owen and I encountered a family party in Oxleas Wood.

Marsh tit *Parus palustris:* not recorded as breeding in 1943-58, but frequently seen in small numbers consorting with other tits in Castlewood, Jackwood and Oxleas Wood from October till March.

Coal tit *P. ater:* bred in small numbers in most of the woods on the Hill; frequently seen with other roving tit flocks from September till March. Noted by Bale during his autumn 1982 vegetation survey and by me on 3 March 1984, when at least one male was singing in Jackwood.

Blue tit *P. caeruleus:* a common resident throughout the Shooters Hill area and numerous in roving bands of other tits outside the breeding season. Reported in 1982 by Bale.

Great tit *P. major:* as blue tit.

Nuthatch *Sitta europaea:* a few pairs nested annually in Castlewood, Jackwood and Oxleas Wood, and were often numerous from October to March, frequently consorting with tit flocks. Reported in 1982 by Bale and as plentiful in the lower, eastern parts of Oxleas Wood by Pye-Smith. During a brief visit on 3 March 1984 I saw and heard at least two in the upper part of Jackwood.

Treecreeper *Certhia familiaris:* a few pairs bred annually in Castlewood, Jackwood and Oxleas Wood. In autumn and winter several were frequently met with in a day in these woods. Also reported to be plentiful in Oxleas Wood in the early 1980s by Pye-Smith and noted as present in the 1987 breeding season in the *London Bird Report* for that year.

Red-backed shrike *Lanius collurio:* recorded as occurring at Shooters Hill in the mid-nineteenth century in the *Fauna of Blackheath*, but has long since vanished as a breeding species from this locality, as it now has, sadly, from the whole of England.

Jay *Garrulus glandarius:* at least 12 pairs nested annually in the period 1943-58 in the Shooters Hill woodlands, including the small woods on the golf course. In May 1958 I found three pairs nesting in Oxleas Wood alone. In autumn and winter they were often quite numerous, and on 3 November 1949, for example, I noted in my journal that they were very numerous everywhere on Shooters Hill, parties of 10-15 being a frequent sight. Noted by Bale during his autumn 1982 vegetation survey and by me during a fleeting visit to Jackwood and Oxleas Wood on 3 March 1984.

Magpie *Pica pica:* although increasing, the magpie was much scarcer in the south-east London area in the period 1943-58 than at the present time: one pair regularly nested in Oxleas Wood after 1947 (when I first saw a magpie on Shooters Hill) and another pair on the golf course from 1949. Bale noted the species during his 1982 vegetation survey and on 3 March 1984 I saw it in both Jackwood and Oxleas Wood.

Jackdaw *Corvus monedula:* a few pairs nested regularly in old trees and buildings on the golf course. In autumn and winter flocks of up to 40 or so could be met with on the golf course and Woodlands Farm, feeding with rooks, and sometimes in Oxleas Meadow.

Rook *C. frugilegus:* up to 100 used to feed throughout the year on the golf course and Woodlands Farm, and in Oxleas Meadow; they presumably came in the breeding season from a rookery somewhere over the Kent border, but I did not discover where, although I watched them fly in from Welling. Bale noted this species during his 1982 vegetation survey of Oxleas Wood and Meadow, Jackwood and Shepherdleas Wood.

Carrion crow *C. corone:* two pairs nested most years on the golf course and there were other breeding pairs in Castlewood, Jackwood and Oxleas Wood. Noted in Oxleas Wood and adjacent woods by Bale in 1982, while I noticed a pair in Oxleas Wood on 3 March 1983.

Starling *Sturnus vulgaris:* a common resident. Outside the breeding season large flocks were often to be seen feeding in Oxleas Meadow, on the golf course and in the fields of Woodlands Farm.

House sparrow *Passer domesticus:* a common breeding species wherever suitable nesting sites existed, such as a ledge on Falconwood Station where I noted three nests in May 1958. In May large numbers search the woods with starlings for defoliating moth caterpillars, and, outside the breeding season, also frequented the golf course and Woodlands Farm.

Tree sparrow *P. montanus:* small flocks of a dozen or so occurred quite frequently on the golf course in autumn and winter.

Chaffinch *Fringilla coelebs:* a common resident almost everywhere on Shooters Hill. Often large flocks fed on the golf course and in the fields of Woodlands Farm in autumn and winter. More recently, chaffinches were among the species seen by Bale during his autumn 1982 vegetation survey, and I noted several in Jackwood and Oxleas Wood during brief visits in August 1983 and March 1984.

Brambling *F. montifringilla:* the only record known to me is of a flock of about 30 in Oxleas Wood on 12 December 1946. While I was watching them a female sparrowhawk made an unsuccessful stoop at one.

Greenfinch *Carduelis chloris:* a fairly common resident on the golf course, Eltham Common and around the margins of Oxleas and the other woodlands.

Goldfinch *C. carduelis:* a few pairs bred annually, mostly on the golf course or in nearby gardens, plus one or two pairs on Eltham Common. In autumn and winter, parties of up to 20 were regularly met with on the golf course and occasionally elsewhere. Before the 'Nine Fields', just west of Shooters Hill, were built on in 1947 many adults and juveniles used to gather to feed on the abundant thistle seeds in late June and July.

Linnet *C. cannabina:* a nest was reported on Shooters Hill in 1904 (Grinling *et al.*). In the period 1943-58 inclusive a few pairs nested annually on the golf course. More recently, this species was among birds noted by Bale in his autumn 1982 survey of the vegetation of the woodlands on the southern slopes.

Redpoll *C. flammea:* not known as a breeding species in the period under review, but small flocks were occasionally seen between October and April inclusive by D. F. Owen and myself, usually in Jackwood or Oxleas Wood. A party of a dozen on 13 April 1947 was pursued by a sparrowhawk along the edge of Oxleas Meadow. The redpoll has become more numerous in the London Area in recent years and was among the species noted by Bale during his autumn 1982 vegetation survey of Oxleas and adjacent woodlands.

Bullfinch *Pyrrhula pyrrhula:* a few pairs bred annually, scattered through Castlewood, Jackwood, Oxleas Wood and the golf course. Bullfinches were among the species listed by Bale during his 1982 vegetation survey and I noted a pair in Jackwood on 3 March 1984.

Yellowhammer *Emberiza citrinella:* several pairs nested annually on the golf course and Woodlands Farm up to 1950 at least. The population was particularly high in the hot summer of 1947.

Corn bunting *E. calandra:* my only record is of a male I found singing on Woolwich Common, at the western foot of Shooters Hill, on 10 May 1946.

Comments

It will be seen from the foregoing that, during the period 1943 to 1958 inclusive, 50 of the 74 species of birds recorded in the Shooters Hill area bred at least once or were thought to have done so. Of these 50 breeding species, 10 nested only on the golf course or adjacent habitats on the northern slopes of the Hill, leaving a total of 40 confirmed or probable breeding species in Oxleas Wood and the other, adjacent woodlands on the southern slopes. If the 1985-7 survey of the breeding species in major London woodlands (Palmer 1987) had been held in say 1946-8 it would have placed this woodland area among the 35 or so woodlands within 20 miles (32.2 km) of St Paul's Cathedral in central London which contain 40 or more breeding species. These totals may be compared with the 34 breeding species reported by Bealey, quoted in Milner (1988), and the 32, 22 and 23 species recorded respectively for Oxleas Wood, Jackwood and Eltham Common in Palmer's 1985-7 survey of the woodlands of the London Area. In the period 1946-8 inclusive my totals for these specific locations were: Oxleas Wood 40 species; Jackwood 34 species and Eltham Common 23 species. Thus Oxleas Wood would have appeared in its own right in the list of woodlands containing 40 or more breeding species.

Shooters Hill Golf Course and its immediate surroundings, with much open ground and only a few woodland fragments and hedgerows, held 42 breeding species in the period 1946-9 and 43 altogether in the whole period 1943-58 inclusive, 10 of which were not known to breed elsewhere on Shooters Hill. These exclusive 10 were grey partridge, swift, house martin, swallow, skylark, jackdaw, wood warbler (once, 1947), tree pipit (once, 1949), linnet and yellowhammer. The all time total of species, so far as my information goes, stands at 81.

Insects

ORTHOPTERA – grasshoppers, bush-crickets and crickets

Nomenclature follows that of Marshall and Haes (1988) and all records given are my own. Some were included in Payne's (1958) paper on the distribution of orthopteroids in the London Area.

Oak bush-cricket *Meconema thalassinum:* plentiful on oaks and other broad-leaved trees in Oxleas Wood, and probably also in other woodlands on the Hill.

Roesel's bush-cricket *Metrioptera roeselii:* present in small numbers on the rough, grassy areas of the golf course and its margins throughout the 1940s and the 1950s, at least up to 1957.

Speckled bush-cricket *Leptophyes punctatissima:* plentiful in nettle beds, brambles and other suitable vegetation at the edges of Oxleas Wood and other woodlands on Shooters Hill, including those fragments on the golf course, and hedgerows.

Field grasshopper *Chorthippus brunneus:* fairly numerous in suitable parts of Oxleas Meadow and a few grassy clearings in Oxleas Wood; also in open, grassy places among oaks and birches on the lower slopes of Eltham Common. Locally common on dry, grassy parts of the golf course.

Meadow grasshopper *C. parallelus:* common in the golf course roughs.

DERMAPTERA – earwigs

Common earwig *Forficula auricularia:* common throughout. On 8 April 1948 D. F. Owen and I found many visiting sugar patches dabbed on to the oaks in Oxleas Wood and Meadow to attract moths.

MACROLEPIDOPTERA – butterflies and the 'larger' moths

I have confined this systematic list to the so-called Macrolepidoptera because I have few personal records of the Microlepidoptera, whereas Paul A. Sokoloff, with the assistance of A. A. Allen and M. Brown, has compiled during the early 1980s an impressive list of some 120 species which I hope he will publish at some future date. I have therefore sent him my own records of 'micros' for this purpose.

In addition to the recent records of species of 'macros' made by Messrs Sokoloff, Allen and Brown (Sokoloff 1984), I have also included the early published records of Fenn (1895), West (1906) and Grinling *et al.* (1909), plus those in the later published works of de Worms (1950, 1953-8), Chalmers-Hunt (1960-81) and Plant (1987).

The nomenclature followed is that used by Plant (1987) for the butterflies and Skinner (1984) for the moths.

BUTTERFLIES

Small skipper *Thymelicus sylvestris:* considered local and very scarce in the south-east London area by Fenn at the end of the nineteenth century and not specifically recorded from Shooters Hill, this butterfly was nevertheless common on the golf course and present in small numbers in Oxleas Meadow and Wood in the period 1945-58 inclusive. It was not, however, mentioned as present in Oxleas Wood and Meadow in Sokoloff's 1984 list, but in 1990 Allen (1991) found a small population in one spot on nearby Woolwich Common which suggests it may still survive on the Shooters Hill Golf Course.

Essex skipper *T. lineola:* the first record of the occurrence of this butterfly in the neighbourhood of Shooters Hill came from Eltham in 1911 (Plant 1987). From at least 1946 to 1958 it was numerous on Eltham Common and Shooters Hill Golf Course, and in Oxleas Meadow and the more open parts of Oxleas Wood (Burton 1979); it probably still is, although Sokoloff does not include it in his 1984 list. Allen (1991, 1992), for instance, has found it to be the commonest butterfly on Woolwich Common, a little to the north-west of Eltham Common.

Large skipper *Ochlodes venata:* this was another species regarded by Fenn as scarce in the south-east London area towards the end of the last century, but by 1909 Grinling *et al.* regarded it as locally common, although Shooters Hill was not specifically mentioned as a locality. From at least 1946 onwards it was numerous on the golf course and quite frequently seen in Oxleas Wood. It is not, however, mentioned in Sokoloff's 1984 list.

Dingy skipper *Erynnis tages:* also regarded by Fenn as very scarce towards the end of the nineteenth century in south-east London, this species was, nevertheless, reported from Shooters Hill in the early 1900s by West (1906), and was common on the Shooters Hill Golf Course from at least 1946 to 1949. I know of no records since, and in 1987 Plant regarded *tages* as having disappeared from all but the extreme south of south-east London.

Grizzled skipper *Pyrgus malvae:* the history of this skipper is much the same as the last. West (1906) found it in Crown Woods and West Wood at Shooters Hill, while from 1946 to at least 1949 it was plentiful on the golf course. Again, I know of no recent records from Shooters Hill.

Clouded yellow *Colias crocea:* I have been unable to find any early records specific to the Shooters Hill area, but I saw it frequently there during the great insect migration year of 1947; also a single female on the golf course on 17 September 1949. Again, I do not know of any more recent records.

Brimstone *Gonepteryx rhamni:* considered fairly common on Shooters Hill by West (1906), it was frequently seen in the 1940s and 1950s, notably in Oxleas wood, and probably still is judging by the distribution map in Plant (1987). However, it does not appear in Sokoloff's 1984 list.

Large white *Pieris brassicae:* common in most years.

Small white *P. rapae:* as previous species.

Green-veined white *P. napi:* as large white. Also listed by Sokoloff (1984).

Orange tip *Anthocharis cardamines:* reported to be abundant up to the late 1870s in the south-east London area, including Shooters Hill, but then apparently became very scarce by the 1890s (Fenn 1895, West 1906). A recovery seems to have begun about 1920 and it was again fairly common by the 1940s, including on the golf course and in the woods of Shooters Hill, such as Oxleas Wood, where it is still to be seen in small numbers (Allen 1991, Sokoloff 1984).

Green hairstreak *Callophrys rubi:* reported from Shooters Hill and West Wood in the latter part of the nineteenth century (Grinling *et al.*), but I do not know of any subsequent records.

Purple hairstreak *Quercusia quercus:* reported to have been abundant in 1858 and 1859 in Shooters Hill Wood (now regarded as part of Oxleas Wood) and nearby at West Wood (long since destroyed) where William West found larvae several years later. Apparently not seen since. Fenn (1895) considered it extinct.

Small copper *Lycaena phlaeas:* reported at the turn of the century (Grinling *et al.*). It was numerous most years from 1943 to 1958 on the golf course, where I found three specimens of ab. *caeruleopunctata* on 14 May 1948, and in Oxleas Meadow. It is not included in Sokoloff's 1984 list, but has been recorded on nearby Woolwich Common as recently as 1991 (Allen 1992).

Silver-studded blue *Plebejus argus:* recorded at Crown Woods by West (1906) without further details. Judging by the other records in his paper, this would probably have been in the 1860s and/or 1870s. Crown Woods then included Oxleas Wood, which name is nowadays applied to the whole of the remaining area formerly covered by Crown Woods and Shooters Hill Wood. It is difficult to conceive that suitable habitat existed for *argus* in the woods at that time, but it is possible that it was either in Oxleas Meadow (then known as Shepherds Leas) or on the opposite, north side of the present A207 road (Watling Street), now occupied by the golf course and Woodlands Farm, or on an adjacent open area, now built upon, then known as Shoulder of Mutton Heath. The species has, of course, long since been extinct at Shooters Hill.

Common blue *Polyommatus icarus:* reported as abundant at Shooters Hill by J. W. Tutt in Grinling *et al.* Frequent on the golf course and in 'The Glade of the Burnets' in Oxleas Wood in the 1940s and 1950s. The only recent records are from nearby Woolwich Common where it continues to survive in good numbers (Allen 1991, 1992).

Holly blue *Celastrina argiolus:* plentiful in good years in Jackwood and Oxleas Wood, and elsewhere on Shooters Hill. In recent years recorded by Sokoloff (1984) in Oxleas Wood and by Allen (1991, 1992) on Woolwich Common.

Red admiral *Vanessa atalanta:* reported from Shooters Hill in Grinling *et al.* Frequent in good years for the species during 1943-58. Apparently no recent reports.

Painted lady *Cynthia cardui:* as last species.

Small tortoiseshell *Aglais urticae:* common in the early 1900s (Grinling *et al.*), in the period 1943-58 and still so nowadays (Sokoloff 1984 and Allen 1991, 1992).

Peacock *Inachis io:* reported in 1907 by J. W. Tutt in Grinling *et al.* Generally plentiful 1943-58 with larvae being found on the golf course. Recently recorded at Oxleas Wood by Sokoloff (1984).

Comma *Polygonia c-album:* not specifically recorded from Shooters Hill until the 1940s, then frequent in Jackwood and Oxleas Wood. Recently recorded in good numbers in Oxleas Wood by Sokoloff (1984) and Allen (1991).

Small pearl-bordered fritillary *Boloria selene:* reported by West (1906) from Shooters Hill in the 1860s and 1870s, but long since extinct.

Pearl-bordered fritillary *B. euphrosyne:* also reported by West (1906) from Shooters Hill in the 1860s, in which period, according to Fenn (1895), it used to be abundant there, but had since disappeared. A. H. Jones, quoted in Grinling *et al.*, stated that it 'was not uncommon at Shooter's Hill Wood' in 1858, but had since disappeared. No later records.

Silver-washed fritillary *Argynnis paphia:* one was seen by West (1906) in West Wood, Shooters Hill, on 25 June 1865. On 26 July 1946 I encountered one in Oxleas Wood, the most recent record of which I have heard.

Speckled wood *Pararge aegeria:* although known as an inhabitant of the Shooters Hill woodlands well before 1890 (Fenn 1895) and West (1906), it had certainly disappeared by that year and was still absent when K. H. Hyatt, D. F. Owen and I visited them regularly in the 1940s and 1950s. It had begun recolonising some of its former haunts in north-west Kent, such as the Bromley area, by 1946; yet as late as 1958 I still failed to find any on Shooters Hill. However, on a visit to Oxleas Wood on 31 August 1983, D. F. Owen and I encountered a few, while Sokoloff (1984) also noted them there, and in 1990 Allen (1991) reported *aegeria* plentiful around willows on the east side of the Hill.

Wall brown *Lasiommata megera:* also reported from Shooters Hill in the 1860s and 1870s by West (1906), but like *aegeria*, disappeared soon afterwards. By 1945 it had returned and was quite frequent, especially on the golf course, up to at least 1950. The only recent record known to me is of one, possibly two, seen on Woolwich Common in 1989 (Allen 1991).

Marbled white *Melanargia galathea:* one captured by A. H. Jones in 1858 on Watling Street between the top of Shooters Hill and Welling (Grinling *et al.*) is the only record known to me.

Gatekeeper (hedge brown) *Pyronia tithonus:* according to Fenn (1895) this 'was formerly one of the most abundant of our butterflies' in the south-east London area, 'swarming along our hedges, and occurring commonly in gardens and many other places; it began to disappear about 1878, and is now quite extinct. The last individual I noticed was at Paul's Cray Common, in 1887'. These remarks of Fenn's imply its occurrence on Shooters Hill as late as the 1870s, which was confirmed by W. West (1906). The gatekeeper was still absent from Shooters Hill in the period 1943-58, the nearest localities being Sundridge Park, north of Bromley (10 km); Petts Wood, Chislehurst (12 km); and Joyden's Wood, Bexley (12 km). It was never, incidentally, abundant in the Lewisham area in the 1940s as stated by de Worms (1950). However, it at last appears to be making an attempt to colonise the Shooters Hill area, as Allen (1991) saw one on the east side of the Hill in 1990 and farther west, on the other side of the Hill, at Woolwich Common in August 1991 (Allen 1992). Possible invasion routes are along the A207 (Watling Street) and A2 roads, and the north Kent railway line from the Dartford area, such as Dartford Heath (13 km ESE), where it has long been numerous. The gatekeeper does not appear in Sokoloff's 1984 list for Oxleas Wood.

Meadow brown *Maniola jurtina:* Grinling *et al.* (1909) imply that this species was common at this date and it was still so on the golf course and in Oxleas Wood in the period under review, and apparently continues to be present as it is mentioned by Pye-Smith (1983) and Sokoloff (1984) for Oxleas Wood. Allen (1991) reported it as still numerous on nearby Woolwich Common.

Small heath *Coenonympha pamphilus:* used to be plentiful on the golf course in the period under review, but the only recent record for the area known to me is Allen's (1991) remark that it is 'plentiful at times' on Woolwich Common, but 'was fitful and uncertain in appearance' there in 1990.

Ringlet *Aphantopus hyperantus:* formerly occurred on Shooters Hill and in West Wood (West 1906), but died out in the area by the 1890s (Fenn 1895). Not seen since.

Moths (Macrolepidoptera)

Ghost moth *Hepialus humuli:* plentiful; included in his Oxleas Wood list by Sokoloff (1984).

Gold swift *H. hecta:* reported by West in Grinling *et al.*, but not since.

Common swift *H. lupulinus:* common (Grinling *et al.*) and still so (Sokoloff 1984).

Goat moth *Cossus cossus:* reported by Tutt in Grinling *et al.* See Addendum on p. 112.

Six-spot burnet *Zygaena filipendulae:* apparently scarce in the south-east London area at the turn of the century, but numerous on the golf course and, to a lesser extent in

Oxleas Wood ('The Glade of the Burnets') in the 1940s and 1950s. The only recent records are from nearby Woolwich Common where Allen (1992) reported that *filipendulae* was abundant in 1990 and previous years, but very scarce in 1991.

Five-spot burnet *Z. trifolii palustrella:* not recorded from the south-east London area in Grinling *et al.*, but numerous 1943-58 on the golf course and in Oxleas Wood ('The Glade of the Burnets'). No recent records.

Narrow-bordered five-spot burnet *Z. lonicerae latomarginata:* as last species.

The festoon *Apoda limacodes:* reported from West Wood and Shooters Hill (Grinling *et al.*); not seen by me, but recorded by Sokoloff (1984).

Large red-belted clearwing *Synanthedon culiciformis:* reported by C. Fenn in Grinling *et al.*, but not since.

December moth *Poecilocampa populi:* no records known to me for 1943-58 or previously, but recently listed by Sokoloff (1984) for Oxleas Wood.

Fox moth *Macrothylacia rubi:* reported by Grinling *et al.*; not since.

Scalloped hook-tip *Falcaria lacertinaria:* recorded in the mid nineteenth century by A. H. Jones (Grinling *et al.*); I recorded one in Oxleas Wood on 13 May 1947 and another was found there by D. F. Owen on 19 May 1947. More recently listed from Oxleas Wood by Sokoloff (1984).

Oak hook-tip *Drepana binaria:* recorded from Oxleas Wood by Sokoloff (1984). No other records.

Pebble hook-tip *D. falcataria:* recorded by A. H. Jones in the mid nineteenth century. No other records.

Peach blossom *Thyatira batis:* recorded from Shooters Hill woods (Grinling *et al.*), but no later records.

Buff arches *Habrosyne pyritoides:* reported from Shooters Hill (Grinling *et al.*) and recently from Oxleas Wood by Sokoloff (1984). No other records.

Poplar lutestring *Tethea or:* recorded in the late nineteenth century by C. Fenn (Grinling *et al.*); not since.

Satin lutestring *Tetheella fluctuosa:* recorded from Shooters Hill Wood in the late nineteenth century by Fenn (Grinling *et al.*); not since.

Oak lutestring *Cymatophorima diluta:* recorded by Sokoloff (1984) from Oxleas Wood; no other records.

Yellow horned *Achlya flavicornis:* recorded by me at electric lamps in Jackwood on 3 April 1948 and listed from Oxleas Wood by Sokoloff (1984).

Light orange underwing *Archiearis notha:* formerly found around the aspens in West Wood and on Shooters Hill (West 1906). No other records.

March moth *Alsophila aescularia:* recorded by J. W. Tutt (Grinling *et al.*); frequent in Jackwood and Oxleas Wood in 1940s and 1950s; included by Sokoloff in his 1984 list for Oxleas Wood.

Grass emerald *Pseudoterpna pruinata:* recorded from Shooters Hill Wood by West (1906). No other records.

Large emerald *Geometra papilionaria:* recorded in the late nineteenth century by Fenn and West (Grinling *et al.*), but not since.

Blotched emerald *Comibaena bajularia:* recorded in the oak woods on Shooters Hill by West (1906) and recently from Oxleas Wood by Sokoloff (1984).

Common emerald *Hemithea aestivaria:* listed by Sokoloff (1984). No other records.

Little emerald *Jodis lactearia:* recorded by Grinling *et al.* and by myself (one) in Oxleas Wood, 28 May 1947.

Birch mocha *Cyclophora albipunctata:* recorded in the mid nineteenth century by A. H. Jones (Grinling *et al.*). No other records.

False mocha *C. porata:* bred from larvae found in the oak woods by West (1906); not since.

Maiden's blush *C. punctaria:* recorded in the mid nineteenth century by A. H. Jones (Grinling *et al.*) and recently by Sokoloff (1984) in Oxleas Wood.

Blood-vein *Timandra griseata:* recorded in the late nineteenth century by Fenn (Grinling *et al.*), by me on the golf course in the late 1940s and recently in Oxleas Wood by Sokoloff (1984).

Cream wave *Scopula floslactata:* reported to be common by J. W. Tutt in Grinling *et al*, and also by West (1906), but not recorded since.

Small fan-footed wave *Idaea biselata:* reported by West (1906), but not since.

Dwarf cream wave *I. fuscovenosa:* recorded in the late nineteenth century by Fenn (Grinling *et al.*), but not since.

Small dusty wave *I. seriata:* reported from Oxleas Wood by Sokoloff (1984).

Single-dotted wave *I. dimidiata:* as *I. seriata.*

Satin wave *I. subsericeata:* reported by Fenn (1895) to have occurred on Shooters Hill in the mid nineteenth century, 'but now (1895) never seen'.

Treble brown spot *I. trigeminata:* reported from Oxleas Wood by Sokoloff (1984).

Riband wave *I. aversata:* reported as common throughout south-east London by J. W. Tutt (Grinling *et al.*), was still so in the 1940s and 1950s (including Shooters Hill) and still present in Oxleas Wood (Sokoloff 1984).

Plain wave *I. straminata:* reported in the mid nineteenth century by Fenn (Grinling *et al.*), but not since.

Flame carpet *Xanthorhoe designata:* recorded by West (1906). No other records.

Red twin-spot carpet *X. spadicearia:* recorded by West (1906) and from Oxleas Wood by Sokoloff (1984).

Dark-barred twin-spot carpet *X. ferrugata:* recorded by West (1906), but no other reports.

Silver-ground carpet *X. montanata:* recorded by Tutt (Grinling *et al.*); common in the 1940s and 1950s, but not listed by Sokoloff (1984).

Garden carpet *X. fluctuata:* abundant throughout south-east London (Grinling *et al.*); common in the 1940s and 1950s and listed by Sokoloff (1984).

July belle *Scotopteryx luridata:* recorded by West (1906), but not since.

Common carpet *Epirrhoe alternata:* common at Shooters Hill (West 1906); no more recent records.

Galium carpet *E. galiata:* reported by West (1906); not since.

Yellow shell *Camptogramma bilineata:* abundant (Grinling *et al.*); common on the golf course and in Oxleas Wood in the 1940s and 1950s; and listed by Sokoloff (1984).

Shoulder stripe *Anticlea badiata:* reported by Tutt (Grinling *et al.*), but not since.

The streamer *A. derivata:* listed by Sokoloff (1984); no earlier records.

Beautiful carpet *Mesoleuca albicillata:* present in the mid nineteenth century (Fenn in Grinling *et al.*); not reported since.

The spinach *Eulithis mellinata:* listed by Sokoloff (1984); no earlier records.

Barred straw *E. pyraliata:* as *E. mellinata.*

Small phoenix *Ecliptopera silaceata:* one at light in Jackwood and another in Castlewood, 14 May 1948. Also recorded in Oxleas Wood by Sokoloff (1984).

Dark marbled carpet *Chloroclysta citrata:* recorded by West (Grinling *et al.*); no other records.

Common marbled carpet *C. truncata:* frequent in Jackwood and Oxleas Wood in 1940s and 1950s; also recorded by Sokoloff (1984).

Grey pine carpet *Thera obeliscata:* recorded by Sokoloff (1984); no previous records.

Broken-barred carpet *Electrophaes corylata:* reported from Shooters Hill Woods by Tutt (Grinling *et al.*) and by Sokoloff (1984).

Beech-green carpet *Colostygia olivata:* reported from Shooters Hill and West Wood by West (1906), but not since.

July highflyer *Hydriomena furcata:* reported by Tutt (Grinling *et al.*) and recently in Oxleas Wood by Sokoloff (1984).

Argent and sable *Rheumaptera hastata:* one recorded by A. H. Jones flying in sunshine on 4 June 1862 in Shooters Hill Wood (Grinling *et al.*). No other records.

Scallop shell *R. undulata:* reported in the mid nineteenth century by Fenn (Grinling *et al.*).

Cloaked carpet *Euphyia biangulata:* recorded by West (1906), but not since.

November moth *Epirrita dilutata:* common, sometimes abundant, in Jackwood and Oxleas Wood, 1943-58, and apparently still so (Sokoloff 1984).

Winter moth *Operophtera brumata:* as in the past, abundant in Jackwood and Oxleas Wood in the 1940s and 1950s, and still present (Sokoloff 1984).

[**Northern winter moth** *O. fagata:* several male specimens, larger and paler than typical *O. brumata*, and taken on Shooters Hill in November 1952 by K. H. Hyatt, could be this species.]

Sandy carpet *Perizoma flavofasciata:* one seen by me on the golf course, 11 June 1947, the only record.

Twin-spot carpet *P. didymata:* reported by West (1906); none since.

Slender pug *Eupithecia tenuiata:* recorded among sallows by Tutt (Grinling *et al.*). No other records.

Mottled pug *E. exiguata:* recorded in Oxleas Wood by Sokoloff (1984). No specific earlier records.

Lime-speck pug *E. centaureata:* as *E. exiguata.*

Wormwood pug *E. absinthiata:* as *E. exiguata.*

Common pug *E. vulgata:* as *E. exiguata.*

Grey pug *E. subfuscata:* as *E. exiguata.*

Bordered pug *E. succenturiata:* as *E. exiguata.*

Brindled pug *E. abbreviata:* as *E. exiguata.*

The V-pug *Chloroclystis v-ata:* reported by West (1906) and in Oxleas Wood by Sokoloff (1984).

Green pug *C. rectangulata:* as *E. exiguata*, above.

Double-striped pug *Gymnoscelis rufifasciata:* as *E. exiguata.*

Small white wave *Asthena albulata:* reported by Tutt (Grinling *et al.*) and in Oxleas Wood by Sokoloff (1984).

The seraphim *Lobophora halterata:* recorded in Oxleas Wood by Sokoloff (1984). No specific earlier records.

Early tooth-striped *Trichopteryx carpinata:* reported from Shooters Hill and West Wood by West (1906), but not since.

The magpie *Abraxas grossulariata:* abundant in the south-east London district in the early 1900s and in the 1940s. One seen by me in Oxleas Meadow on 6 June 1946 and more recently recorded from Oxleas Wood by Sokoloff (1984).

Clouded border *Lomaspilis marginata:* recorded in Oxleas Wood by Sokoloff (1984). No specific earlier records.

Scorched carpet *Ligdia adustata:* As *L. marginata* above.

Peacock moth *Semiothisa notata:* reported from Shooters Hill Wood in the mid nineteenth century by A. H. Jones (Grinling *et al.*). No other records.

Latticed heath *S. clathrata:* reported by West (1906); common on the golf course in the 1940s until at least 1949, but no subsequent reports.

Brown silver-line *Petrophora chlorosata:* reported from bracken areas of Shooters Hill by West (1906) and Tutt (Grinling *et al.*) and from Oxleas Wood by Sokoloff (1984).

Barred umber *Plagodis pulveraria:* reported by Fenn as becoming scarce in the mid nineteenth century (Grinling *et al.*). No recent reports.

Scorched wing *P. dolabraria:* reported to be extinct by the mid nineteenth century by Fenn (1895).

Brimstone moth *Opisthograptis luteolata:* reported as abundant throughout the south-east London area in the early 1900s (Grinling *et al.*); still frequent in Jackwood and Oxleas Wood in the 1940s and 1950s, and also recently listed by Sokoloff (1984).

Speckled yellow *Pseudopanthera macularia:* reported by West (1906) and Tutt (Grinling *et al.*); still common in the woods on the golf course in the 1940s. No recent reports.

Canary-shouldered thorn *Ennomos alniaria:* recorded in Oxleas Wood by Sokoloff (1984). No earlier records specific to Shooters Hill.

Dusky thorn *E. fuscantaria:* as *E. alniaria.*

Early thorn *Selenia dentaria:* frequent at light in Jackwood in the 1940s and recorded more recently from Oxleas Wood by Sokoloff (1984).

Scalloped hazel *Odontopera bidentata:* recorded in Oxleas Wood by Sokoloff (1984). No other specific records.

Scalloped oak *Crocallis elinguaria:* reported by Tutt (Grinling *et al.*) and recently in Oxleas Wood by Sokoloff (1984).

Feathered thorn *Colotois pennaria:* reported by Tutt (Grinling *et al.*); frequent at light in Jackwood in the 1940s and 1950s, and recently found by Sokoloff (1984) in Oxleas Wood.

Pale brindled beauty *Apocheima pilosaria:* common (Tutt in Grinling *et al.*) and also in the 1940s and 1950s in Castlewood, Jackwood and Oxleas Wood. Reported recently in the last-mentioned wood by Sokoloff (1984).

Brindled beauty *Lycia hirtaria:* common in the 1940s and 1950s throughout the area and still present (Sokoloff 1984).

Oak beauty *Biston strataria:* I found one male in Jackwood on 9 April 1947 and another male at light there on 6 April 1948. No other reports.

Peppered moth *B. betularia:* frequent on Shooters Hill in the 1940s and 1950s. Recently reported from Oxleas Wood by Sokoloff (1984).

Spring usher *Agriopis leucophaearia:* reported by West (1906) and Tutt (Grinling *et al.*). Frequent in Jackwood and Oxleas Wood in the 1940s and 1950s. No other reports.

Scarce umber. *A. aurantiaria:* recorded in Oxleas Wood by Sokoloff (1984). No earlier records.

Dotted border *A. marginaria:* frequent in Oxleas Wood in the 1940s and 1950s, and also recently recorded there by Sokoloff (1984).

Mottled umber *Erannis defoliaria:* common in the woods, including Jackwood and Oxleas Wood, where the larvae were sometimes to be found in huge numbers such as the 'thousands' noted by D. F. Owen on 19 May 1947. Recently noted in Oxleas Wood by Sokoloff (1984).

Waved umber *Menophra abruptaria:* occasional at light in Jackwood in the late 1940s. No recent records.

Willow beauty *Peribatodes rhomboidaria:* frequent in the 1940s and 1950s. Recently recorded from Oxleas Wood by Sokoloff (1984).

Mottled beauty *Alcis repandata:* recorded by Tutt (Grinling *et al.*); frequent in the 1940s and 1950s, and recorded from Oxleas Wood by Sokoloff (1984).

Great oak beauty *Boarmia roboraria:* recorded in West Wood and on Shooters Hill in the late nineteenth century by West (1906). None recorded since.

Pale oak beauty *Serraca punctinalis:* I caught one male ab. *humperti* at light in Jackwood on 14 May 1948. No other records.

The engrailed *Ectropis bistortata:* recorded by West (Grinling *et al.*); frequent in Jackwood and Oxleas Wood in the 1940s and 1950s, and still present (Sokoloff 1984).

Square spot *Paradarisa consonaria:* recorded by West (1906), but not since.

Brindled white-spot *P. extersaria:* formerly present in Shooters Hill Wood in the mid nineteenth century (A. H. Jones in Grinling *et al.*). No other records.

Grey birch *Aethalura punctulata:* recorded by West (1906) from Crown Woods and West Wood, and by Tutt (Grinling *et al.*), but not since then.

Common white wave *Cabera pusaria:* frequent in the 1940s and recently reported from Oxleas Wood by Sokoloff (1984).

Common wave *C. exanthemata:* occasionally seen in Oxleas Wood in the 1940s and recently found there by Sokoloff (1984).

White-pinion spotted *Lomographa bimaculata:* recently found in Oxleas Wood by Sokoloff (1984). No other records.

Clouded silver *L. temerata:* recorded in West Wood in the late nineteenth century by West (1906). No other records until discovered in Oxleas Wood by Sokoloff (1984).

Light emerald *Campaea margaritata:* recorded by Tutt (Grinling *et al.*) and recently in Oxleas Wood by Sokoloff (1984).

Privet hawk-moth *Sphinx ligustri:* the only definite records come from Sokoloff for Oxleas Wood, but it almost certainly occurred on Shooters Hill in the 1943-58 period as it was plentiful then in the adjacent districts of Charlton and Woolwich, etc.

Lime hawk-moth *Mimas tiliae:* I found one newly emerged on the golf course on 15 June 1946; almost certainly plentiful on Shooters Hill generally, 1943-58, as it was in the surrounding districts. Recorded recently in Oxleas Wood by Sokoloff (1984).

Eyed hawk-moth *Smerinthus ocellata:* noted on the golf course in June 1947 and probably plentiful on Shooters Hill, 1943-58, as it was in the neighbourhood.

Poplar hawk-moth *Laothoe populi:* same remarks apply as for *S. ligustri.*

Narrow-bordered bee hawk-moth *Hemaris tityus:* seen by West in West Wood, Shooters Hill in 1866 (Grinling *et al.*), but no records since.

Humming-bird hawk-moth *Macroglossum stellatarum:* occasionally seen on Shooters Hill in good migration years for this species, as in 1947, when it was frequent.

Elephant hawk-moth *Deilephila elpenor:* same remarks apply as for *S. ligustri.*

Buff-tip *Phalera bucephala:* no specific early records, but abundant throughout the south-east London area (Grinling *et al.*); plentiful on Shooters Hill in the 1940s and recently recorded in Oxleas Wood by Sokoloff (1984).

Lobster moth *Stauropus fagi:* one recorded by A. H. Jones in the mid nineteenth century (Grinling *et al.*). No other reports.

Iron prominent *Notodonta dromedarius:* recorded by West (1906) and recently in Oxleas Wood by Sokoloff (1984).

Pebble prominent *Eligmodonta ziczac:* recorded by Tutt (Grinling *et al.*). No other records.

Lesser swallow prominent *Pheosia gnoma:* found in Oxleas Wood (Sokoloff 1984). No earlier records.

Coxcomb prominent *Ptilodon capucina:* bred from larvae (West 1906); also recorded by Tutt (Grinling *et al.*) and in Oxleas Wood recently (Sokoloff 1984).

Pale prominent *Pterostoma palpina:* I caught a male at light in Jackwood on 14 May 1948. No other records.

Small chocolate-tip *Clostera pigra:* bred by West (1906) from females found on creeping willow *Salix repens.* No other records.

Chocolate-tip *C. curtula:* as *C. pigra.*

The vapourer *Orgyia antiqua:* common 1943-58, and also recorded in Oxleas Wood by Sokoloff (1984).

Pale tussock *Calliteara pudibunda:* recorded from Shooters Hill Woods by West (1906), frequent 1946-58 and also recently listed from Oxleas Wood (Sokoloff 1984).

Yellow-tail *Euproctis similis:* recorded by Tutt (Grinling *et al.*), but not since.

Rosy footman *Miltochrista miniata:* recorded from West Wood by West (1906). No other records.

Red-necked footman *Atolmis rubricollis:* recorded by West (1906). No other records.

Garden tiger *Arctia caja:* recorded by Tutt (Grinling *et al.*); larvae common 1943-58 and still present in 1980s (Sokoloff 1984).

Cream-spot tiger *A. villica:* occurred last century (Fenn in Grinling *et al.*). No other records.

White ermine *Spilosoma lubricipeda:* common (Grinling *et al.*), 1943-58, and also recorded (in Oxleas Wood) by Sokoloff (1984).

Buff ermine *S. luteum:* common in the period 1943-58. No more recent records.

Muslin moth *Diaphora mendica:* recorded by A. H. Jones in Shooters Hill Road in the mid-nineteenth century. No other records.

The cinnabar *Tyria jacobaeae:* not recorded from Shooters Hill last century and none seen in the period 1943-58. However, in 1991 Allen (1992) found large numbers of larvae on common ragwort *Senecio jacobaea* on nearby Woolwich Common.

Turnip moth *Agrotis segetum:* not specifically recorded from Shooters Hill at the turn of the century, but reported by Grinling *et al.* to be in abundance everywhere in the south-east London area. I have no specific Shooters Hill records either, but Sokoloff (1984) recorded it in Oxleas Wood.

Heart and club *A. clavis:* described as rare in Grinling *et al.*, the only reports of it on Shooters Hill known to me are those recorded in Oxleas Wood by Sokoloff (1984).

Heart and dart *A. exclamationis:* as *A. segetum.*

Dark sword-grass *A. ipsilon:* reported by A. H. Jones in the nineteenth century (Grinling *et al.*), but not since.

Shuttle-shaped dart *A. puta:* reported by A. H. Jones in the nineteenth century (Grinling *et al.*); frequently encountered by me and recently recorded by Sokoloff (1984) in Oxleas Wood.

The flame *Axylia putris:* frequent in the 1940s and 1950s; recently recorded in Oxleas Wood by Sokoloff (1984).

Flame shoulder *Ochropleura plecta:* recorded in Grinling *et al.* and recently by Sokoloff (1984) in Oxleas Wood.

Large yellow underwing *Noctua pronuba:* described by Grinling *et al.* as extremely abundant everywhere in the south-east London area, it was still common in the 1940s and 1950s on Shooters Hill and remains so at the present time (Sokoloff, 1984).

Lesser yellow underwing *N. comes:* always common in the south-east London area (Grinling *et al.*), it continued so in the 1940s and 1950s and has been reported recently (Sokoloff 1984) from Oxleas Wood.

Broad-bordered yellow underwing *N. fimbriata:* no records since C. E. Page reported it from Shooters Hill in Grinling *et al.*

Lesser broad-bordered yellow underwing *N. janthina:* recorded by Sokoloff (1984) in Oxleas Wood; no other records.

Double dart *Graphiphora augur:* reported by Charles Fenn from Shooters Hill in the nineteenth century (Grinling *et al.*), but not since.

Autumnal rustic *Paradiarsia glareosa:* recorded in the last century by A. H. Jones (Grinling *et al.*), but not since.

Pearly underwing *Peridroma saucia:* as *P. glareosa.*

Ingrailed clay *Diarsia mendica:* recorded by West (1906), Grinling *et al.*, myself in the late 1940s and recently in Oxleas Wood by Sokoloff (1984).

Barred chestnut *D. dahlii:* recorded in the late nineteenth century by West (1906), but not subsequently.

Purple clay *D. brunnea:* as *D. dahlii.*

Small square-spot *D. rubi:* reported to be abundant by J. W. Tutt in Grinling *et al.* and still plentiful in the late 1940s. No recent records.

Setaceous Hebrew character *Xestia c-nigrum:* no early records specific to Shooters Hill, but common in the 1940s and 1950s, and recorded recently in Oxleas Wood by Sokoloff (1984).

Dotted clay *X. baja:* recorded from Shooters Hill by J. W. Tutt (Grinling *et al.*), but not since.

Six-striped rustic *X. sexstrigata:* recorded by West (1906), but not since.

Square-spot rustic *X. xanthographa:* a common species now and in the past.

Green arches *Anaplectoides prasina:* reported from Shooters Hill, including Crown Woods (now Oxleas Wood) by West (1906), but not recorded since.

Red chestnut *Cerastis rubricosa:* recorded in the last century (Grinling *et al.*), but not subsequently.

Pale shining brown *Polia bombycina:* as previous species.

Silvery arches *P. hepatica:* recorded by West (1906) on Shooters Hill and in Crown Woods. No subsequent records.

Grey arches *P. nebulosa:* no early records specific to Shooters Hill, but recently recorded in Oxleas Wood by Sokoloff (1984).

Cabbage moth *Mamestra brassicae:* has always been common.

Dot moth *M. persicariae:* as previous species.

Beautiful brocade *Lacanobia contigua:* reported to be rare in the south-east London area, although formerly found at Shooters Hill in the last century by Fenn (Grinling *et al.*).

Pale-shouldered brocade *L. thalassina:* reported from Shooters Hill by J. W. Tutt (Grinling *et al.*), but not since.

Bright-line brown-eye *L. oleracea:* reported to be very common in the south-east London area by J. W. Tutt (Grinling *et al.*) without specifically mentioning Shooters Hill; was common there in the 1940s and 1950s and has been recently recorded in Oxleas Wood by Sokoloff (1984).

[**Broom moth** *Ceramica pisi:* I know of no records specific to Shooters Hill, but it should be present.]

Varied coronet *Hadena compta:* since its colonisation of Britain from 1948 onwards through Kent, this species has spread over much of south-eastern England and is now locally common. I never encountered it in the south-east London area in the 1950s, so it is particularly interesting to note that it has recently been found in Oxleas Wood by Sokoloff (1984).

Small quaker *Orthosia cruda:* although Shooters Hill is not specifically mentioned, *cruda* was described as generally distributed and abundant in the south-east London/north-west Kent area at the turn of the century (Grinling *et al.*), and was common at sallow blossom and at lamps in Jackwood and Oxleas Wood in the 1940s and 1950s. It is apparently still so as Sokoloff (1984) has recorded it from Oxleas Wood.

Blossom underwing *O. miniosa:* recorded by Grinling *et al.* as local and scarce in the south-east London area, it continued to be so in the period 1943-58 and we only occasionally met with it at sallow blossom in Oxleas Wood, where Sokoloff failed to find it in the early 1980s.

Powdered quaker *O. gracilis:* no early records specific to Shooters Hill, but it was plentiful at the lamps and sallow blossom in Jackwood and Oxleas Wood in the 1940s and 1950s. Curiously, it was not among the *Orthosia* species found in Oxleas Wood by Sokoloff (1984).

Common quaker *O. stabilis:* as *O. cruda.*

Clouded drab *O. incerta:* also as *O. cruda.*

Twin-spotted quaker *O. munda:* no early records specific to Shooters Hill, but it occurred in very small numbers at the lamps and sallow blossom in Jackwood and Oxleas Wood in the 1940s and 1950s. Recently, it has again been recorded in Oxleas Wood by Sokoloff (1984).

Hebrew character *O. gothica:* as *O. cruda.*

The clay *Mythimna ferrago:* recorded last century by A. H. Jones (Grinling *et al.*), still frequent in the 1940s and 1950s, but not found by Sokoloff (1984).

Smoky wainscot *M. impura:* recorded by J. W. Tutt (Grinling *et al.*) and occasionally by me at light in the late 1940s and early 1950s. No more recent records.

Common wainscot *M. pallens:* recorded by Tutt and H. E. Page in the early 1900s (Grinling *et al.*) and by myself in the 1940s and 1950s. Recently found in Oxleas Wood by Sokoloff (1984).

Shoulder-striped wainscot *M. comma:* recorded by Fenn in the last century (Grinling *et al.*), but no more recent reports.

Star-wort *Cucullia asteris:* stated by Grinling *et al.* to be rare and local in the south-east London/north-west Kent area, it occurred up to the latter half of the nineteenth century on both Shooters Hill and in West Wood, where A. H. Jones and West (1906) used to find the larvae on golden-rod *Solidago virgaurea.* Although this plant still occurs in Oxleas Wood, *asteris* has not been found since then.

Sword-grass *Xylena exsoleta:* described by Grinling *et al.* as rare in the south-east London area, it was reported by A. H. Jones from Shooters Hill last century. There are no more-recent records.

Brindled green *Dryobotodes eremita:* recorded in the latter part of last century by West (1906), but not since.

Large ranunculus *Polymixis flavicincta:* as previous species.

The satellite *Eupsilia transversa:* no early records specific to Shooters Hill, but it was plentiful at lamps in Jackwood and Oxleas Wood in the 1940s and 1950s. Recently recorded in the latter wood by Sokoloff (1984).

The chestnut *Conistra vaccinii:* as previous species.

The brick *Agrochola circellaris:* as *E. transversa* above.

Yellow-line quaker *A. macilenta:* as *E. transversa.* Ab. *obsoleta* occurred regularly in the 1940s and 1950s.

Brown-spot pinion *A. litura:* as *E. transversa.*

Beaded chestnut *A. lychnidis:* as *E. transversa.*

Pink-barred sallow *Xanthia togata:* reported from 'near Shooters Hill' in 1773 (Chalmers-Hunt 1960-81), but not since.

Poplar grey *Acronicta megacephala:* recorded by J. W. Tutt (Grinling *et al.*) and still present in the 1950s, but no later records.

The miller *A. leporina:* recorded in the previous century by C. Fenn (Grinling *et al.*), but not since.

Grey dagger *A. psi:* recorded by J. W. Tutt (Grinling *et al.*); plentiful in 1943-58 and recently reported in Oxleas Wood by Sokoloff (1984).

Knotgrass *A. rumicis:* recorded by West (1906) and frequent in the 1940s and 1950s, but no recent records.

The coronet *Craniophora ligustri:* reported in the nineteenth century by Fenn (Grinling *et al.*) and West (1906), but not since.

Marbled beauty *Cryphia domestica:* recorded recently in Oxleas Wood (Sokoloff 1984). There are apparently no earlier reports referring specifically to Shooters Hill.

Copper underwing *Amphipyra pyramidea* and **Svensson's copper underwing** *A. berbera svenssoni:* the earliest Shooters Hill record of which I am aware is a nearly fully grown larva which I found on bramble in Oxleas Wood on 28 May 1947. This was, of course, before the discovery in 1968 of the very similar *A. berbera svenssoni*, so it was not distinguished from that species at the time. However, even allowing for a quicker metamorphosis in captivity, the date of emergence, 27 June 1947, suggests *berbera*; also I still remember over 45 years that the eleventh segment ended in a distinctly hawkmoth-like red caudal horn, because at first I really thought I had found a hawkmoth larva, and not in a yellowish straight spike like *pyramidea.* Recently, Sokoloff (1984) has found imagines in Oxleas Wood, but has not attempted to distinguish between the two species.

Bird's wing *Dypterygia scabriuscula:* recorded in the early 1900s (Grinling *et al.*), but no records since then.

Brown rustic *Rusina ferruginea:* as previous species.

Small angle shades *Euplexia lucipara:* as *D. scabriuscula* above.

Angle shades *Phlogophora meticulosa:* numerous (Grinling *et al.*); still so in the 1940s and 1950s. Recorded by Sokoloff (1984) from Oxleas Wood.

Heart moth *Dicycla oo:* recorded from Shooters Hill in the nineteenth century by C. Fenn (Grinling *et al.*), but not subsequently.

The dun-bar *Cosmia trapezina:* reported to be abundant by J. W. Tutt (Grinling *et al.*), plentiful in the 1940s and 1950s, and recorded from Oxleas Wood by Sokoloff (1984).

Dark arches *Apamea monoglypha:* although not specifically mentioned as occurring on Shooters Hill, Grinling *et al.* stated it to be common throughout the south-east London area. It was still plentiful on Shooters Hill in the 1940s and 1950s and has recently been recorded from Oxleas Wood by Sokoloff (1984).

Light arches *A. lithoxylaea:* reported in the previous century by A. H. Jones (Grinling *et al.*) and still frequently met with in the 1940s and 1950s, but no more recent records.

Clouded-bordered brindle *A. crenata:* recorded in the nineteenth century (Grinling *et al.*), but not since.

Clouded brindle *A. epomidion:* as previous species.

Rustic shoulder-knot *A. sordens:* stated by J. W. Tutt to be abundant on Shooters Hill (Grinling *et al.*), but no records from more recent times.

Marbled minor *Oligia strigilis:* without specifically mentioning Shooters Hill, reported to be abundant throughout the south-east London area in the early 1900s (Grinling *et al.*); still common in the 1940s and 1950s, and also recently recorded in Oxleas Wood by Sokoloff (1984).

Common rustic *Mesapamea secalis* and **lesser common rustic** *M. secalella:* as *M. secalella* was only recognized as a distinct species from the extremely similar *M. secalis* in 1983, it is not possible to say to which species earlier records belong, except where specimens exist in collections. Although not specifically mentioning Shooters Hill, Grinling *et al.* stated that *secalis* was generally distibuted and common throughout the south-east London area as it or/and *secalella* continued to be in the 1940s and 1950s. Sokoloff (1984) lists both species from Oxleas Wood.

Treble lines *Charanyca trigrammica:* recorded in the nineteenth century by A. H. Jones (Grinling *et al.*), but not since then.

Vine's rustic *Hoplodrina ambigua:* recorded by Sokoloff (1984) in Oxleas Wood; no earlier reports following its colonisation of Kent in 1968.

Mottled rustic *Caradrina morpheus:* although not specifically reported from Shooters Hill in Grinling *et al.*, it was stated to be generally distributed in the south-east London area and remained so in the 1940s and 1950s. Recently reported from Oxleas Wood by Sokoloff (1984).

Pale mottled willow *C. clavipalpis:* as previous species.

Scarce silver-lines *Bena prasinana:* one larva collected from an oak in Oxleas Wood by D. F. Owen on 19 May 1947, the only Shooters Hill record of which I am aware.

Green silver-lines *Pseudoips fagana britannica:* reported from Shooters Hill by William West (1906), where he found larvae on birch and hazel. Not noted 1943-58, but recently found in Oxleas Wood by Sokoloff (1984).

Burnished brass *Diachrysia chrysitis:* recorded by J. W. Tutt (Grinling *et al.*), occasionally noted in the late 1940s and early 1950s, and recently seen in Oxleas Wood by Sokoloff (1984).

Silver Y *Autographa gamma:* has always been common in most years when immigration has been strong.

Red underwing *Catocala nupta:* a male captured at a lamp in Jackwood and released by D. F. Owen and myself on 19 October 1951 is the only record of which I am aware.

Dark crimson underwing *C. sponsa:* Barrett (1892-5) states that this species formerly occurred at Shooters Hill, but Fenn (1895), West (1906) and Grinling *et al.* did not mention this.

Mother Shipton *Callistege mi:* one in Oxleas Meadow, 6 June 1946; frequent on Shooters Hill Golf Course in the late 1940s. No other reports.

Burnet companion *Ectypa glyphica:* plentiful on Shooters Hill Golf Course in the 1940s. No other records.

The herald *Scoliopteryx libatrix:* recorded from Shooters Hill in Grinling *et al.* and occasionally noted in Oxleas Wood in the 1940s and 1950s. No more recent records.

Lesser belle *Colobochyla salicalis:* a single specimen of this very localised species, now confined to woodland near Ham Street, south-east Kent, was found in Shooters Hill Wood (now Oxleas Wood) on 11 June 1859 by A. H. Jones (Grinling *et al.*).

Beautiful hook-tip *Laspeyria flexula:* found recently in Oxleas Wood by Sokoloff (1984). I know of no other records.

The snout *Hypena proboscidalis:* apparently always plentiful on Shooters Hill (Grinling *et al.*, Sokoloff 1984).

Buttoned snout *H. rostralis:* reported by Tutt to be common in the south-east London area, including Shooters Hill at the turn of the century (Grinling *et al.*), this species has much decreased in Britain since (Skinner 1984) and there are no recent records.

Common fan-foot *Pechipogo strigilata:* reported as an inhabitant of the Shooters Hill woodlands by Tutt (Grinling *et al.*) and West (1906), but no more recent records, it not having been seen in Kent since 1973.

Small fan-foot *Herminia nemoralis:* reported as occurring in the Shooters Hill woodlands by West (1906) and recently reported from Oxleas Wood by Sokoloff (1984).

Comments

The Shooters Hill area was well worked by entomologists in the nineteenth century, so the foregoing lists 275 species of Macrolepidoptera as having been recorded there since 1773, of which 184 species (about 66 per cent) have been noted as still present from 1943 onwards. Of these 184, those species not specifically recorded before 1943 are assumed to have been present unless known not to have been so, such as the two moths Vine's rustic *Hoplodrina ambigua* and the varied coronet *Hadena compta* which have colonised the area since post-1968 in the first instance and post-1948 in the second. Of this 'all time' list of 275 species, 107 species (39 per cent) are particularly associated with ancient woodland. These are listed in Table 1, from which it will be noticed that 62 (58 per cent) have still been found to occur in the years since 1943, 51 (48 per cent) of them since 1980. More intensive field-work may yet show that at least some of the other species, not seen since before 1943, continue to survive in the older parts of the woodlands, especially Oxleas Wood, and on the golf course. This belief is, in fact, supported by Paul Sokoloff's rediscovery of several species not previously seen since the turn of the century.

Those species which have disappeared since the last decade or two of the nineteenth century, appear to have done so through a combination of such factors as population declines due to climatic oscillations (notably, the generally wetter trend between about 1870 and 1920); smoke pollution (serious until the Clean Air Acts of the 1950s took effect); decline in traditional woodland management, especially coppicing; and habitat destruction and fragmentation. The felling of the large and very attractive West Wood (adjoining Oxleas Wood) after the 1870s to make way for housing, together with the general, insidious encroachment of bricks and mortar on all sides of Shooters Hill since the end of the First World War, have seriously reduced the extent of the undeveloped land connecting it with the more open countryside beyond, and thus the corridors through which wildlife species can travel to replenish declining populations.

The published accounts of Fenn (1895), West (1906) and others who worked the south-east London and north-west Kent areas in the last century all bemoan the marked decline in the populations of many species (Fenn put it at about 100) of butterflies and moths from the late 1870s onwards. Among those affected were the brimstone butterfly *G. rhamni*, orange tip *A. cardamines*, green hairstreak *C. rubi,* purple hairstreak *Q. quercus,* peacock *I. io*, comma *P. c-album*, small pearl-bordered and pearl-bordered fritillaries *B. selene* and *B. euphrosyne*, silver-washed fritillary *A. paphia*, speckled wood *P. aegeria*, wall brown *L. megera*, gatekeeper *P. tithonus*, ringlet *A. hyperantus*, six-spot burnet *Z. filipendulae*, small eggar *Eriogaster lanestris*, cream-spot tiger *A. villica* and muslin moth *D. mendica.* Some of these, notably *rhamni, cardamines, io, c-album, paphia, aegeria, megera* and *filipendulae*, made a spectacular comeback betwen about 1920 and 1950; *P. aegeria* continues to colonise new territory towards London, while *P. tithonus* is currently making a late comeback on the fringes of south-east London and looks like colonising Shooters Hill after an absence of at least a century.

It is probable that although other factors, such as those mentioned above may have played a part, the underlying cause of the decline of at least some of these species was the climatic change in the North Atlantic/north-west Europe sector from about 1870, which led to Britain experiencing a more maritime climate with milder, wetter winters and cooler, less sunny summers. From around 1920 to 1950 the British climate returned to its former pattern of colder winters and warmer summers, but more markedly so, with runs of consecutive hot summers and cold winters; and this coincided with the recovery and expansion of range of these Lepidoptera where suitable habitats still existed. The current climatic warming may be helping the range expansions of such species as *P. tithonus* and the Essex skipper *T. lineola.* These changes in range and abundance of the species mentioned have not, of course, been confined to the London Area.

For reasons already explained I have not dealt with the Microlepidoptera in this paper, but it is worth mentioning that in addition to the 120 species recently recorded by P. A. Sokoloff (1984) and his helpers, a further 30 species have been specifically recorded on Shooters Hill in the past (Grinling *et al.*). Altogether this increases the total list of species of Lepidoptera for Shooters Hill from 273 to 423, and the total recorded since 1943 from 184 to 304. Several of these species are recognised as nationally uncommon by the insect red data book (Shirt 1987).

General Conclusions

As is obvious from this survey, the extensive mosaic of old, semi-natural woodland, formerly coppiced woodland, woodland plantation, secondary woodland (Eltham Common), open grassland (the golf course) and arable land (Woodlands Farm) made the Shooters Hill area rich in wildlife, both plant and animal. Even with the losses of woodland in the late nineteenth century (Figure 1) on the north side of the Hill (much of Clothmakers Wood) and to the south-east (West Wood), it has remained one of the best wildlife sites in the London Area. It will be seen from the foregoing account of the wildlife species recorded that the designation of Oxleas Wood as a Site of Special Scientific Interest is fully justified. The proposed destruction of the eastern portion of Oxleas Wood and much of Shepherdleas Wood to make way for the East London River Crossing road will seriously impair their ecological viability which was already damaged by the destruction a century ago of the adjoining West Wood, also an ancient woodland. Further destruction is unacceptable.

On its route north, the road will also split Woodlands Farm (a working farm) in two and seriously reduce its value to wildlife as a link in the green corridor linking Oxleas and the other Shooters Hill woodlands with open land at East Wickham and the chain of woodland extending east-north-east from Bostall Woods to Lesnes Abbey Woods, and the Erith Marshes beyond. It may also result in damage to or the possible destruction of the ancient hedgerow, containing, among other species, wild service trees *S. torminalis* and wood anemone *A. nemorosa*, and estimated to be up to 600 years old (Swales *et al.* 1989).

The future viability of Shooters Hill and its scientifically and educationally highly important wildlife habitats and communities can be assured if, even at this late hour, the East London River Crossing can be averted and the woodlands and other interesting habitats managed in the light of modern techniques of wildlife conservation. This might involve traditional management methods, such as the revival of coppicing in those parts of the woodlands where it was quite recently practised until the dismantling of the Greater London Council. The judicious creation of woodland clearings would also be beneficial, especially to the ground flora and many invertebrates.

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ADDENDUM. Goat moth *Cossus cossus:* in the Sept./Oct. 1992 issue of *Entomologist's Rec. J. Var.* **104:** 265-271, A. A. Allen, writing on 'Some notable Diptera from Oxleas Wood SSSI, Shooter's Hill, NW Kent', describes finding on 29 June 1988 a fallen oak infested towards the base by larvae of the goat moth. He states that it is the only infested tree he has ever come across there. (See p. 101).

The Comments on p. 110 and Table 1 have been amended to incorporate this recent record.

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Those references marked with an asterisk were taken from Milner (1988) and not actually seen by me as I was unable to obtain copies of them.

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TABLE 1. Lepidoptera primarily associated with ancient woodland recorded on Shooters Hill.

Species	**Periods in which species have been recorded**			
	Pre-1900	1900-42	1943-59	1960-90
Purple hairstreak *Quercusia quercus*	×			
Pearl-bordered fritillary *Boloria euphrosyne*	×			
Holly blue *Celastrina argiolus*	×	×	×	×
Silver-washed fritillary *Argynnis paphia*	×		×	
Speckled wood *Pararge aegeria*	×			×
Goat moth *Cossus cossus*	×	×		×
The festoon *Apoda limacodes*	×	×		×
Large red-belted clearwing *Synanthedon culiciformis*	×			
December moth *Poecilocampa populi*				×
Scalloped hook-tip *Falcaria lacertinaria*	×		×	×
Oak hook-tip *Drepana binaria*				×
Pebble hook-tip *D. falcataria*	×			
Peach blossom *Thyatira batis*	×	×		
Buff arches *Habrosyne pyritoides*	×	×		×
Poplar lutestring *Tethea or*	×			
Satin lutestring *Tetheella fluctuosa*	×			
Oak lutestring *Cymatophorima diluta*				×
Yellow horned *Achlya flavicornis*			×	×
Light orange underwing *Archiearis notha*	×			
Large emerald *Geometra papilionaria*	×			
Blotched emerald *Combaena bajularia*	×	×		×
Little emerald *Jodis lactearia*	×	×	×	
Birch mocha *Cyclophora albipunctata*	×			
False mocha *C. porata*	×	×		
Maiden's blush *C. punctaria*	×			×
Cream wave *Scopula floslactata*	×	×		
Small fan-footed wave *Idaea biselata*	×	×		
Plain wave *I. straminata*	×			
Flame carpet *Xanthorhoe designata*	×	×		
Beautiful carpet *Mesoleuca albicillata*	×			
Dark marbled carpet *Chloroclysta citrata*	×	×		
Broken-barred carpet *Electrophaes corylata*	×	×		×
Beech-green carpet *Colostygia olivata*	×	×		
Argent and sable *Rheumaptera hastata*	×			
Scallop shell *R. undulata*	×			
November moth *Epirrita dilutata*	×	×	×	×
Winter moth *Operophtera brumata*	×	×	×	×
Slender pug *Eupithecia tenuiata*	×	×		
Mottled pug *E. exiguata*				×
Brindled pug *E. abbreviata*				×
Small white wave *Asthena albulata*	×	×		×
The seraphim *Lobophora halterata*				×
Early tooth-striped *Trichopteryx carpinata*	×	×		
Clouded border *Lomaspilis marginata*				×
Scorched carpet *Ligdia adustata*				×
Peacock moth *Semiothisa notata*	×			
Barred umber *Plagodis pulveraria*	×			

Species	**Periods in which species have been recorded**			
	Pre-1900	1900-42	1943-59	1960-90
Scorched wing *P. dolabraria*	×			
Speckled yellow *Pseudopanthera macularia*	×	×	×	
Dusky thorn *Ennomos fuscantaria*				×
Feathered thorn *Colotois pennaria*	×	×	×	×
Oak beauty *Biston strataria*			×	
Spring usher *Agriopis leucophaearia*	×	×	×	
Scarce umber *A. aurantiaria*				×
Mottled beauty *Erannis defoliaria*	×	×	×	×
Great oak beauty *Boarmia roboraria*	×			
Pale oak beauty *Serraca punctinalis*			×	
The engrailed *Ectropis bistortata*	×	×	×	×
Square spot *Paradarisa consonaria*	×	×		
Brindled white-spot *P. extersaria*	×			
Grey birch *Aethalura punctulata*	×	×		
Common white wave *Cabera pusaria*			×	×
Common wave *C. exanthemata*			×	×
White-pinion spotted *Lomographa bimaculata*				×
Clouded silver *L. temerata*	×			×
Light emerald *Campaea margaritata*	×			×
Buff-tip *Phalera bucephala*	×	×	×	×
Lobster moth *Stauropus fagi*	×			
Iron prominent *Notodonta dromedarius*	×	×		×
Coxcomb prominent *Ptilodon capucina*	×	×		×
Pale tussock *Calliteara pudibunda*	×	×	×	×
Rosy footman *Miltochrista miniata*	×	×		
Red-necked footman *Atolmis rubricollis*	×	×		
Barred chestnut *Diarsia dahlii*	×			
Purple clay *D. brunnea*	×			
Green arches *Anaplectoides prasina*	×	×		
Grey arches *Polia nebulosa*				×
Pale-shouldered brocade *Lacanobia thalassina*	×	×		
Small quaker *Orthosia cruda*	×	×	×	×
Blossom underwing *O. miniosa*		×	×	
Common quaker *O. stabilis*	×	×	×	×
Clouded drab *O. incerta*	×	×	×	×
Twin-spotted quaker *O. munda*			×	×
Star-wort *Cucullia asteris*	×			
Brindled green *Dryobotodes eremita*	×			
The satellite *Eupsilia transversa*			×	×
The chestnut *Conistra vaccinii*			×	×
The brick *Agrochola circellaris*			×	×
Yellow-line quaker *A. macilenta*			×	×
Brown-spot pinion *A. litura*			×	×
Poplar grey *Acronicta megacephala*	×	×	×	
The miller *A. leporina*	×			
Grey dagger *A. psi*	×	×	×	×
Copper underwing *Amphipyra pyramidea*			×?	×?
Svensson's copper underwing *A. berbera*			×?	×?
Small angle shades *Euplexia lucipara*	×	×		
Heart moth *Dicycla oo*	×			
The dun-bar *Cosmia trapezina*	×	×	×	×
Scarce silver-lines *Bena prasinana*			×	
Green silver-lines *Pseudoips fagana*	×	×		×
Red underwing *Catocala nupta*			×	
Dark crimson underwing *C. sponsa*	×			
The herald *Scoliopteryx libatrix*	×	×	×	
Lesser belle *Colobochyla salicalis*	×			
Beautiful hook-tip *Laspeyria flexula*				×
Common fan-foot *Pechipogo strigilata*	×	×		
Small fan-foot *Herminia nemoralis*	×	×		×

Book Review

New Flora of the British Isles. By Clive Stace, with illustrations mainly by Hilli Thompson. Cambridge University Press. [1991] 1992. 1,226 pp. £24.95. ISBN 0 521 42793 2.

This flora is unlike any that has gone before, and very much a product of its time. In particular, it is totally different from the one work with which its title invites comparison, the *Flora of the British Isles* of Clapham, Tutin and Warburg (1952, 1962) later Clapham, Tutin and Moore (1987), Most notably, by producing camera-ready copy, the author has had much greater control over the content and appearance of the finished work. The consequence is a flora which reflects Prof. Stace's personal ideals rather than any publisher's house rules. These ideals favour clarity and simplicity, so there are few abbreviations, lots of mathematical expressions (e.g. '≥2x' for 'at least twice as long as') and ample inclusion of aliens. The format does not allow any ranking of species by type size, with the result that wool-aliens which may never be seen again in Britain are given the same prominence as common weeds; this risks encouraging wrong identifications, contrary to the author's avowed aims, and upsets the balance of the work, as all but the most obscure and long-forgotten aliens are keyed and described. The typist (rumoured to be Mrs Stace) has made excellent use of paragraph formatting, but unfortunately no machine indexing programme has been used, with the result that *Calamagrostis, Ceratocapnos* and others are out of alphabetical sequence in the index and nine genera are omitted from it altogether.

Prof. Stace's purpose of providing a comprehensive identification manual of the British Flora, of manageable size for outdoor use, has been brilliantly achieved. The keys cannot be faulted. Plants are illustrated by photographs, including micrographs where appropriate, or by line drawings, but only in cases where illustrations are genuinely more explicative than detailed textual description. Like any other, this book will be made out of date by new discoveries. In the long term, judgement of it will I believe centre on the narrowness of his purpose. Clapham *et al.* provided a great deal of information irrelevant to the strict needs of identification, for which Stace has no room. Their work had a broader concept of the function of a national flora. Whereas Stace gives us photographs of leaves of every *Sorbus* known in Britain, permitting instant identification of the most localised microspecies, 'C.T.W.' supplies data which help understand how these narrow endemics might have arisen. The two approaches are complementary.

In the short term, attention is being focussed unduly on the large number of changed names. Many of them have appeared already in the periodical literature, and are clearly required by the current International Code of Botanical Nomenclature. It is reasonable to quibble only about changes which depend on taxonomic opinion. In a work which justly queries the value of many proposed subspecies, it is a pity that the splitting of genera such as *Bromus* has been accepted. Your reviewer is more concerned by the adoption of an unfamiliar sequence of families, which will make the book harder to get used to quickly. Arguments about the representation of the consequences of evolution in an optimum linear sequence are exceedingly theoretical and have nothing to do with plant identification.

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R. M. Burton

A Working List of the Lacewings of the London Area

By Colin W. Plant*

Summary

This account deals with the lacewings and their allies, the Raphidioptera, Megaloptera, Neuroptera and Mecoptera. The status and distribution of all species recorded in the London Area – a circle of 20 miles (32 km) radius centred upon St Paul's Cathedral – is summarised and preliminary distribution maps are presented for this area. Four Raphidioptera, three Megaloptera, 48 Neuroptera and four Mecoptera are recorded, representing 81.9 per cent of the current British total of 72 species.

Introduction

The true lacewings (Neuroptera) are a widely recognised, if poorly documented, group of insects. The common green lacewing, or goldeneye *Chrysoperla carnea*, will be familiar to most people, largely on account of its habit of entering dwellings and other buildings to hibernate. Not all who encounter it, however, realise that it is but one of 14 'green' lacewings which are currently regarded as British, many of which come close to equalling the widespread and common status of *C. carnea.* Most field naturalists will also be familiar with one or more of the 20 'brown' lacewings belonging to the genera *Hemerobius* and *Wesmaelius*, though few may be able to separate the species. Others may recognise the distinctive hook-tipped lacewing *Drepanepteryx phalaenoides* – also a member of the brown lacewing family.

The familiar alderflies, often seen in numbers along river banks and around ponds and lakes wherever there is emergent vegetation, have truly aquatic larvae and our three British species represent the Megaloptera *sensu stricto* in this country. The distinctive snakeflies, so named because of the elongate prothorax which gives the appearance of a long, snake-like neck, were, until recently regarded as members of the Megaloptera. They are now placed in a separate order, the Raphidioptera, principally because their larvae are terrestrial.

Three scorpionflies, and the less familiar snow-flea, make up the rather distantly related Mecoptera. In male scorpionflies the tip of the abdomen is swollen to form a genital capsule which is held forward over the body in the manner of a scorpion.

These four orders of insects are traditionally lumped together. They thus form a compact group of 72 British species which are convenient for study.

Sources of Records

No list of the lacewings and allies exists at present for the London Area, though a number of references to localities within this region are made in the entomological literature. Apart from rare references in the annual report of the Bookham Common Survey, there appears to be no lacewing records published in this journal. Since I have recently been involved in gathering lacewing data for the entire British Isles, and since these data are now computerised, it has been relatively easy to extract and collate records made within the London Natural History Society's recording area (Figure 1).

As far as recent records are concerned there have been two major sources – active collecting by Graham Collins in Surrey and by myself in Essex, Herts. and Middlesex. A number of other entomologists have also collected and

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*Passmore Edwards Museum, Romford Road, London E15 4LZ.
Address for records: 14 West Road, Bishop's Stortford, Hertfordshire CM23 3QP.

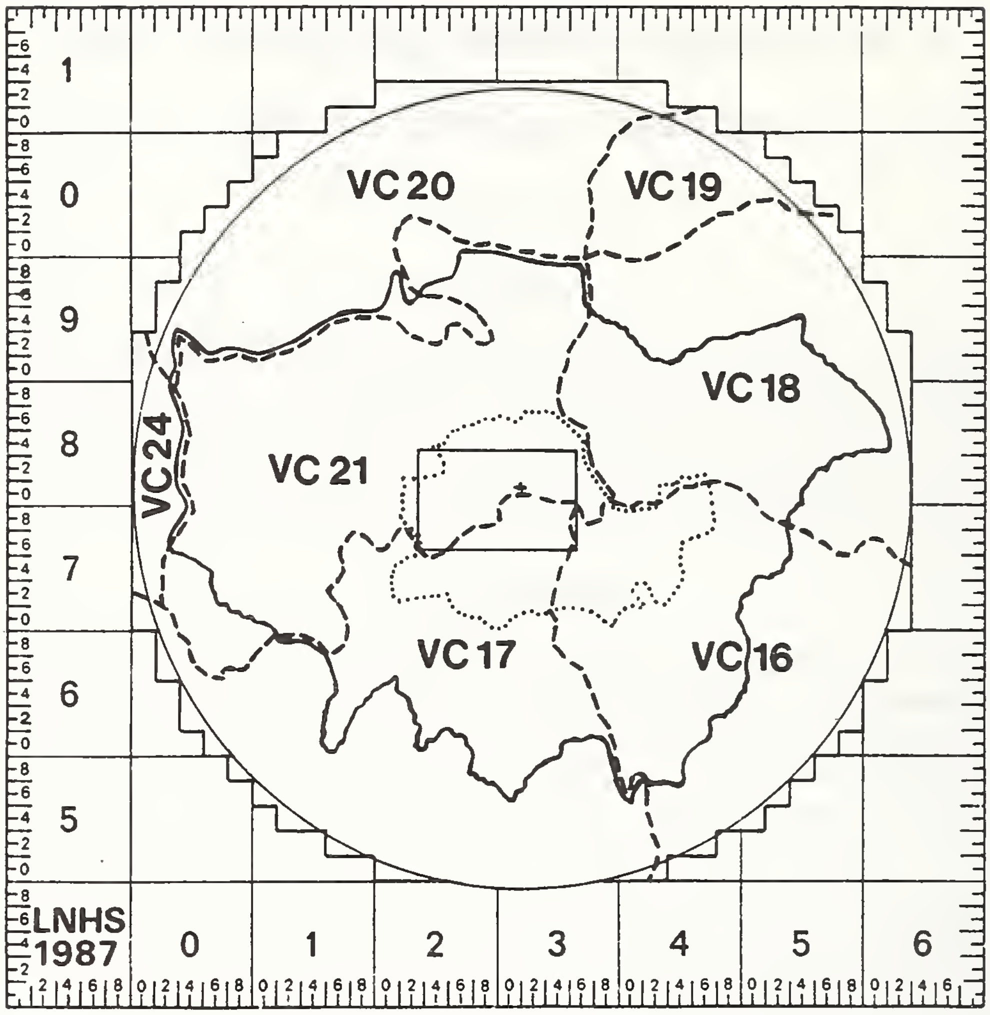

Fig. 1. The Society's Recording Areas. ······ London County Council area, ——— Greater London area, – – – – Watsonian Vice-counties – VC 16 West Kent, VC 17 Surrey, VC 18 South Essex, VC 19 North Essex, VC 20 Herts, VC 21 Middlesex, VC 24 Bucks. The central rectangle shows the Society's Inner London area with St Paul's Cathedral marked by a cross.

recorded in the London Area and their records too are incorporated. Older records also have two principal sources – the entomological literature and museum collections. The literature has been fairly well covered and all references in the major entomological journals, past and present, have been extracted. However, it is possible that other records may lie awaiting discovery in county and local literature which has not yet been researched; I welcome any offers of assistance in this area! The pinned collections at the British Museum (Natural History) have been examined, but fluid-preserved material has not, as yet. The entire collections of the Passmore Edwards Museum have also been researched, but those of smaller local museums have not. The Hope Department Entomological Museum of Oxford University is known to have London Area material, though I have not as yet managed to find time to research this. However, most of the important material there is reported in the entomological literature and it is considered unlikely that any important records have been missed.

Validation of Records

Existing keys for the identification of lacewings and their allies are out of print, out of date and full of errors and ambiguities! For this reason I have insisted, in most cases, on either myself or another experienced person seeing actual specimens to enable verification of the determinations. In the case of many literature records this has involved frequent trips to museums outside the London Area to locate voucher material. All records were transcribed to the RA68 record cards of the national recording scheme and, without exception, checked by me. From these cards, data were entered onto the B.R.C. computer at Monks Wood and subjected to an automated procedure for checking given grid reference against stated vice-county. Non-matching parameters thus detected were investigated and records either corrected or rejected. A set of national distribution maps, produced for the *Provisional atlas of the Neuroptera, Megaloptera, Raphidioptera and Mecoptera of Great Britain and Ireland* (Plant 1992) was next printed and any apparently 'out of range' records were investigated and, if appropriate, corrected. After the completion of this validation procedure, London Area records were abstracted from the computer and hand-plotted onto London Area tetrad maps. Two further grid reference errors at tetrad level were detected in this manner. As a result of this validation procedure, it is considered that the 1,023 records included in this Working List may be wholly relied upon as being correct.

Lacewings and their Allies in the London Natural History Society's Recording Area

All species for which a record is available within 20 miles (32 kilometres) of St Paul's Cathedral are listed and the status and distribution summarised. Ten-kilometre square distribution maps are presented with the aim of stimulating a flow of records in the direction of the author, who is also willing to identify and return specimens. For fuller details of national distributions, habitat requirements, flight periods of the adults, and most frequently recorded capture methods the reader is referred to Plant (1992).

The taxonomy and nomenclature of the lacewings has undergone enormous changes in recent years and a new synonymic checklist is given in Plant (1992). The list which follows adheres to the sequence and nomenclature in that work and thus, in accordance with editorial practice, the names of the authors of the scientific names are omitted.

RAPHIDIOPTERA – Snakeflies

Although seldom seen because of their largely arboreal habits, snakeflies are amongst the most distinctive of insects. The pronotum is elongated to give the appearance of a long neck between thorax and abdomen, a feature which gives rise to the colloquial name for the group. Females possess a long, fine ovipositor which is employed in the laying of eggs beneath the bark of trees or logs. All species are wholly terrestrial, a fact which distinguishes them from the Megaloptera, in which group they have reposed for many years. The four British species are voracious carnivores, both as larvae and as adults. The larvae may be found under the bark of both living trees and fallen logs.

RAPHIDIIDAE

Subilla confinis (Map 1)

Local and rare. This is the rarest of the British species and one which is possibly associated with coniferous trees though inadequate data are available to confirm this long-held theory. There are three recent records from South Essex, one from Surrey, and an old record in West Kent.

Atlantoraphidia maculicollis (Map 2)

An insect of *Pinus* plantations, occasionally recorded on *Larix*. Quite common in southern England and just creeping into the London Area in Surrey, with older records from western Middlesex and western Hertfordshire. Perhaps genuinely absent from most of the remainder of the London Area though likely to spread.

Phaeostigma notata (Map 3)

The commonest of the four snakeflies in the London Area and certainly associated with *Quercus*, possibly obligatorily so. Widespread and possibly quite common wherever a reasonable stand of oak trees exists. Strangely, not reported from the West Kent portion of our area.

Xanthostigma xanthostigma (Map 4)

A fairly widespread and locally common insect in the Midlands and East Anglia, with London Area records confined to the north of the urban connurbation, none reported from our portion of Surrey. Evidence suggests that the long-held theory that this species is confined to *Salix* is probably incorrect; larvae have been found under the bark of oak logs, though not in the London Area.

MEGALOPTERA – Alderflies

These large, dark-winged insects are a familiar site along river banks, canal towpaths and around ornamental lakes. Eggs are laid in masses on emergent vegetation and upon hatching the larvae drop into the water and take up a fully aquatic existence. Emergence of the adults is usually synchronised and it is quite usual to see several dozens of adults sitting on waterside vegetation waiting for their wings to harden and dry. There are three British species and correct separation requires examination of the genitalia in both sexes.

SIALIDAE

Sialis fuliginosa (Map 5)

Two records from the nineteenth century, one each in Surrey and West Kent. This is a species of clean, faster flowing waters and is probably no longer present in the London Area.

Sialis lutaria (Map 6)

The commonest and most widespread of the British species has a similar status in the London Area. It is almost certainly under recorded, and likely to occur in most unpolluted water bodies in the area where there is a good layer of mud or silt below. The increase in city nature areas and the associated introduction of ponds with emergent vegetation will doubtless encourage *S. lutaria* to spread right into the urban area of London, though there are no records as yet. London's park lakes may be able to support populations if areas of emergent vegeation are created.

Sialis nigripes (Map 7)

This was not recognised as a British Isles species until as recently as 1976 (Barnard 1977). However, recent researches show it to be quite widespread across the country, though very localised, and possibly having some affinity with a calcareous geology. There is a single London Area record from near Leatherhead in May 1893; the specimen is in the J. C. Dale collection at the National Museum of Wales, Cardiff. It is likely still to be present in some of the Surrey rivers in our area.

NEUROPTERA

The original group 'Neuroptera', as defined by Linnaeus, contained dragonflies, caddisflies, stoneflies and all the lacewings as well as Psocoptera and other groups of insects. Over the years, the order Neuroptera has gradually been whittled down to leave only the old suborder Planipennia, a name which has now been dropped. The Neuroptera thus now comprises the true lacewings which will be dealt with family by family.

CONIOPTERYGIDAE – Waxflies or dusty wings

These are fairly atypical lacewings in their general appearance to the casual observer. None of the ten British species has a wingspan of more than a few millimetres and to the untrained eye the adult insects resemble whiteflies (Hemiptera: Aleyrodidae) or psocids (Psocoptera). Identification is a matter of examining the internal genital apparatus of the male (*vide* Plant 1991). Most records have been made from light-traps.

Conwentzia psociformis (Map 8)

Widespread and locally quite common on deciduous trees and bushes, almost certainly present in central London where aphids are left unsprayed.

Conwentzia pineticola (Map 9)

Until recently considered a variety of *C. psociformis*, the full specific status of this taxon is now widely recognised. The paucity of records stems from this long held confusion though, as a species restricted to *Pinus*, its distribution is unlikely to be as wide as that of its congener.

Coniopteryx tineiformis (Map 10)

Widespread and very common, but hopelessly under recorded. Associated with deciduous trees and bushes.

Coniopteryx borealis (Map 11)

Widespread and quite common, in some areas outnumbering *C. tineiformis.* Associated with deciduous trees, especially *Quercus.*

Coniopteryx parthenia (Map 12)

Local and apparently uncommon. Recorded only from the Surrey sector. Recorded in Britain from both deciduous and coniferous trees and I have beaten males from both *Ilex aquifolium* and *Taxus baccata.*

Coniopteryx esbenpeterseni (Map 13)

Only recently discovered as a British species (Hynd and Plant 1991) though subsequent searching has revealed museum specimens collected during the last century. In the London Area it is recorded from Croydon in 1881 and from Darenth Wood in 1878, these being the earliest known British specimens. In recent years it has been found at Wisley, Surrey and Harpenden, Herts., both just outside our recording area, and there is no reason to suppose that it does not persist unnoticed within our boundary.

Semidalis aleyrodiformis (Map 14)

Probably widespread and locally common in a circle around the truly urban zone, though there are few recent records.

Parasemidalis fuscipennis (Map 15)

Probably widespread, but at present known only in our area from four records. Almost certainly under recorded.

Aleuropteryx juniperi (Map 16)

This minute lacewing was added to the British list from Juniper Top at Box Hill, Surrey in 1968 (Ward 1970). Apart from a single male beaten from *Cupressus* at Silwood Park, Berkshire in 1966 (misidentified at the time as *Helicoconis lutea*), this remains the only British locality. It is not known if the insect still persists at Juniper Top. It is thought to be restricted to *Juniperus.*

OSMYLIDAE

This family of giant lacewings is represented in Europe by two species, one of which occurs in the west, including Britain.

Osmylus fulvicephalus (Map 17)

A widespread and usually common species associated with clean, faster-flowing streams, typically in wooded valleys. It is most frequent in Wales, the West Country and the southern counties and just creeps into the London Area in Surrey, where there are three records from the early part of the present century and in West Kent, where there is a record from the same era.

SISYRIDAE

The spongeflies are small, fairly nondescript lacewings, represented in Britain by three species, only one of which is at all common. The larvae are parasitic on freshwater sponges and it thus follows that clean water is required for their presence.

Sisyra dalii (Map 18)

Only recorded for the London Area from a single site in Surrey during the last century. It may still be present here and elsewhere in the Surrey sector.

Sisyra fuscata (Map 19)

Widespread and quite common. Noted from a wide variety of water bodies including garden ponds. Likely to be present in central London as an introduction.

Sisyra terminalis (Map 20)

A nationally local species represented in the London Area by a handful of records in the south-west. It is likely to persist in this region, but rather unlikely to be found elsewhere.

HEMEROBIIDAE

The brown lacewings are a large family, represented in Britain by 30 species in seven genera. Six of these genera, comprising a total of 22 species, are recorded for the London Area.

Psectra diptera (Map 21)

Formerly considered rare in Britain, this small lacewing is now proving to be fairly widespread and locally common. There are two records for our area, both recent, from Croydon in Surrey and Aveley in Essex. The typical form of the adult insect has vestigial hind wings and is not capable of flight. It is most frequently recorded from pitfall-traps and water-traps. A macropterous form, in which all four wings are fully developed, also occurs, possibly as part of a dispersal strategy when populations reach a critical density. These forms are often taken in lepidopterists' light-traps.

Micromus variegatus (Map 22)

Widespread and locally very common, but not recorded from the central area.

Micromus angulatus (Map 23)

Local and apparently rare, recorded recently in our area from Croydon, Surrey, Beechen Wood, West Kent and Barnet, Herts. with a 1966 record from Ruislip and a nineteenth century record from West Wickham. Probably overlooked, but certainly a rural species which will not be encountered in the central zone.

Micromus paganus (Map 24)

Widespread and very common, but under recorded in much of our area. Frequently the most abundant species in light-traps.

Hemerobius humulinus (Map 25)

Widespread and very common, often reported from gardens. Probably only absent from the extreme centre of our area.

Hemerobius simulans (Map 26)

Apparently rare. Recorded from West Kent in 1894 and the roof of the British Museum (Natural History) in South Kensington in 1987. Possibly overlooked, as many seem to confuse this species with *H. humulinus*.

Hemerobius stigma (Map 27)

A common species in *Pinus* plantations, which is therefore not widely spread in the London Area. It is almost certainly under recorded and will probably be found in most areas where pines are present in numbers.

Hemerobius pini (Map 28)

Another pine-tree species, and one which is widespread but seldom encountered in large numbers. There are only three London Area records for the present century, but this is undoubtedly a reflection of the lack of specific searching in the appropriate habitat.

Hemerobius contumax (Map 29)

There is a single confirmed record of this nationally rare species, from Black Park, Bucks. on 25 June 1873. It is confined to *Pinus sylvestris*.

Hemerobius nitidulus (Map 30)

There are surprisingly few London Area records of this insect, which is, nationally, a fairly widespread and common species.

Hemerobius micans (Map 31)

A widespread and very common species in our area, likely to be beaten from almost every large oak tree in the region, even in the central area from which there are presently no records.

Hemerobius lutescens (Map 32)

Widespread and quite common in association with deciduous trees, bushes and hedges. Also recorded from suburban gardens but not yet known from the central area of London.

Wesmaelius ravus (Map 33)

Discovered new to science from Oxshott, Surrey in 1922 and captured again from the same locality in 1923 (Withycombe 1923). It has not been reported from there since, but perhaps has not been specifically looked for. There are only four other known British localities, including the Royal Horticultural Society's Gardens at Wisley, Surrey, just a short distance outside our boundary.

Wesmaelius betulinus (Map 34)

Widespread and quite common in association with deciduous trees, including *Betula*.

Wesmaelius subnebulosus (Map 35)

Widespread and extremely common, in association with deciduous trees. Regular in suburban gardens.

Wesmaelius concinnus (Map 36)

Associated with *Pinus* in a woodland habitat, there are London Area records from the Surrey vice-county only. It must surely be present elsewhere in the region?

Wesmaelius quadrifasciatus (Map 37)

Apparently strictly associated with *Larix decidua* in Britain, it is recorded sparingly from the north-western sector of the London Area.

Sympherobius elegans (Map 38)

The scattered records possibly indicate that this may be more widespread than existing data indicate. Records are available from Herts., South Essex and West Kent in strictly rural areas.

Sympherobius pygmaeus (Map 39)

Apparently the most widespread of the four *Sympherobius* species in the London Area with records from South Essex, West Kent, Surrey and Middlesex.

Sympherobius pellucidus (Map 40)

Represented in the London Area by three widely spread records in South Essex, Surrey and Middlesex.

Sympherobius fuscescens (Map 41)

Apparently rare in our area, with a single old record and a single recent record in the Surrey sector and one old record from Hertfordshire.

Drepanepteryx phalaenoides (Map 42)

Very local, but probably under recorded. It should be looked for in mature deciduous woodland where mature oaks are also present. It has been suggested (e.g. Collins 1990) that it may hibernate as an adult and it should therefore be looked for by searching the debris which gathers under brambles, in tree-forks and so on during the winter months. Adults come to tungsten-filament lights and less often to mercury-vapour light.

CHRYSOPIDAE – Green lacewings

The green lacewings are a worldwide family, with over 1,200 species in some 86 genera. Until very recently, the British species were considered to belong to two genera – *Nathanica* and *Chrysopa*. Recently, Brooks and Barnard (1990) reviewed the world genera of Chrysopidae and it is now evident that British '*Chrysopa*' comprises six genera, namely *Chrysopa, Chrysoperla, Cunctochrysa, Chrysopidia, Mallada* and *Nineta*. Together with *Nothochrysa* (the correct name for the old genus *Nathanica*) there are thus seven chrysopid genera in Britain. Currently, we recognise 16 species as British. Recently, however, Leraut (1991) suggested that *Chrysoperla carnea* comprises four separate species and, in a separate, earlier work (Leraut 1988) that *Cunctochrysa albolineata* comprises two species. Neither *carnea* nor *albolineata* has yet been examined for these segregate taxa in Britain, so they are exluded from the present list and the analysis. However, it should be borne in mind that these additional taxa may possibly be present under the two species mentioned in the London Area.

Chrysopa commata (Map 43)

Recently (Kis and Ujhelyi 1965) split from *C. phyllochroma*, this is proving to be the more common of the pair in Britain. Pre-1965 records are disregarded unless the specimens could be traced and examined; this accounts for the apparently sparse London Area distribution. The species is likely to be widespread and common in grassland habitats.

Chrysopa dorsalis (Map 44)

Extremely rare, possibly extinct in the London Area. The species is restricted to pine trees and is only recorded from Oxshott, Surrey on 7 July 1900 and again in 1921. It comes readily to ultraviolet light, so ought to be located easily if it is present. Lepidopterists are encouraged to save and send me their green lacewings from light-traps!

Chrysopa perla (Map 45)

Widespread and often locally abundant, but absent from the true urban zone.

Chrysopa pallens (Map 46)

Widespread and locally common. Frequent in town parks and comes readily to both lit windows and moth-traps.

Chrysopidia ciliata (Map 47)

Widespread, but seldom numerous. A deciduous woodland species which is probably under-recorded in the London Area.

Cunctochrysa albolineata (Map 48)

Widespread and common; locally abundant. Absent from truly urban areas, but possibly present in the larger parks.

Chrysoperla carnea (Map 49)

Ubiquitous and very common, often locally extremely abundant. Penetrates to the very centre of the London Area. Possibly a partial immigrant.

Mallada flavifrons (Map 50)

Strangely, recorded only south of the River Thames in our area, where it appears to be distinctly local. This is a surprise because over the whole of Britain it is widely distributed in England and Wales up to a line from the Humber to the Dee. Possibly it is overlooked, but it was certainly never taken in my light-trap in East Ham from 1982 to 1986 (run every night of the year) and I have never found it in south-west Essex by any other method. It comes regularly to the tungsten-filament bulbs of the Rothamsted Insect Survey light-traps elsewhere in England and Wales.

Mallada prasina (Map 51)

Formerly regarded as a variety of *M. ventralis*, this species is sparingly recorded in open habitats in South Essex, Middlesex and Bucks. It is probably under recorded.

Mallada ventralis (Map 52)
Widespread but local, though frequently common where it occurs. The distinctive black venter makes identification in the field an easy task, which probably accounts for its apparently wider distribution than that of *M. prasina.* In reality, both are likely to be widespread and common in suitable areas.

Nineta flava (Map 53)
Widespread and quite common on oak trees, especially in woodland. Under-recorded outside Essex.

Nineta vittata (Map 54)
Probably widespread but local. Many specimens seem to have been confused with *N. flava* or *Chrysopa pallens* in the past.

Nothochrysa capitata (Map 55)
Widespread and quite common, albeit locally so. Apparently restricted to the tops of mature trees where its arboreal habits may mask a general abundance.

MECOPTERA – Scorpionflies and allies

The scorpionflies and allies are not actually very closely related to the Neuroptera, but they are traditionally regarded together as a single group referred to as 'the lacewings'. In Britain we have the true scorpionflies in the family Panorpidae, and the snow-flea in the family Boreidae. In Europe, a third family, the Bittacidae, is represented.

BOREIDAE – Snow-fleas or moss-fleas

Boreus hyemalis (Map 56)
The snow-flea is a small (8 mm) flightless insect, with stiffened vestigial wings in the male and a distinctive ovipositor in the female. Adults mature at the end of autumn and are to be found all winter through to March. They are most frequently taken in pitfall traps, but the species is very under recorded because of its seasonality. There is only one recent record, of an adult amongst *Sphagnum* in Epping Forest. Probably widespread and common in undisturbed areas.

PANORPIDAE – Scorpionflies

Characterised by the genital capsule of the male which is held forward over the body in the manner of a scorpion. They are, of course, totally harmless to humans, and completely lack either sting or any form of venom.

Panorpa cognata (Map 57)
A single London Area record is available from Epsom Common, Surrey in 1990. The species is possibly restricted to calcareous soils.

Panorpa communis (Map 58)
Widespread and very common except in urban areas.

Panorpa germanica (Map 59)
Widespread and very common except in urban areas.

Analysis

Group	Total of British species	Total recorded for London Area	Percentage of British species recorded
RAPHIDIOPTERA	4	4	100
MEGALOPTERA	3	3	100
NEUROPTERA	61	48	78.7
Coniopterygidae	11	9	81.8
Osmylidae	1	1	100
Sisyridae	3	3	100
Hemerobiidae	30	22	73.3
Chrysopidae	16	13	81.3
MECOPTERA	4	4	100
All 'lacewings'	72	59	81.9

Acknowledgements

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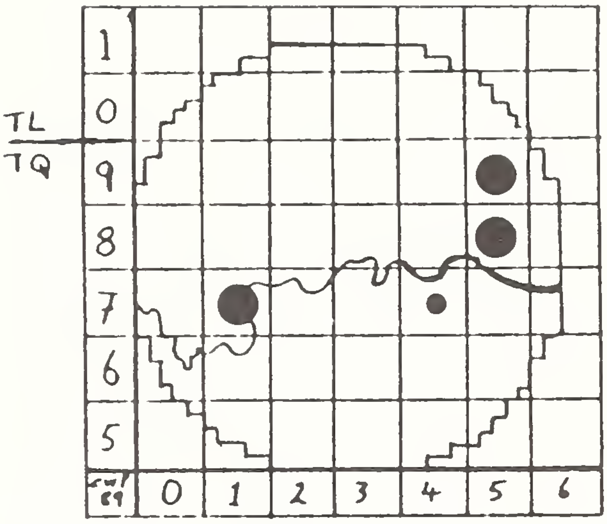
The Distribution Maps

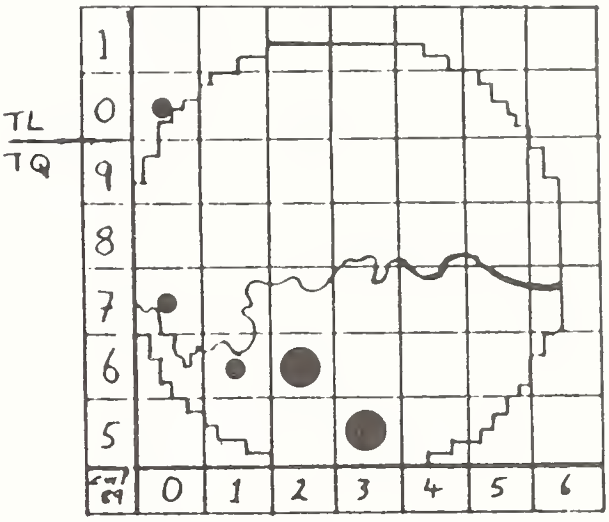
All species are mapped using the following symbols:

● record made since 1 January 1970

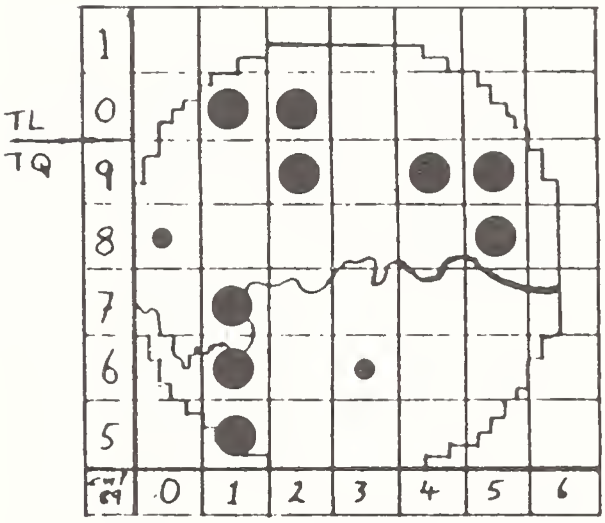
• record made prior to 1970



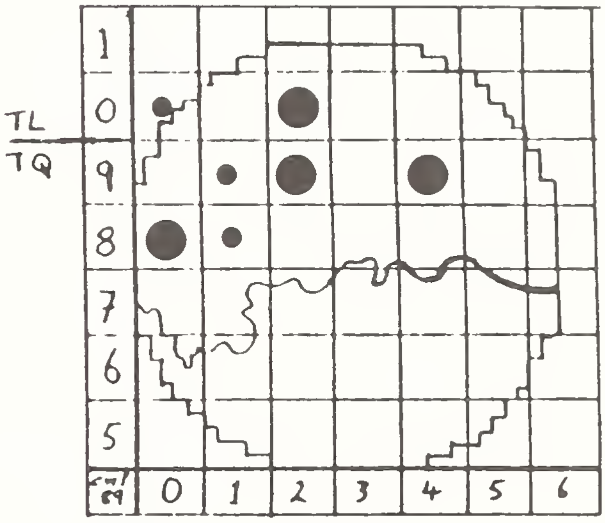
Map 1. *Subilla confinis*



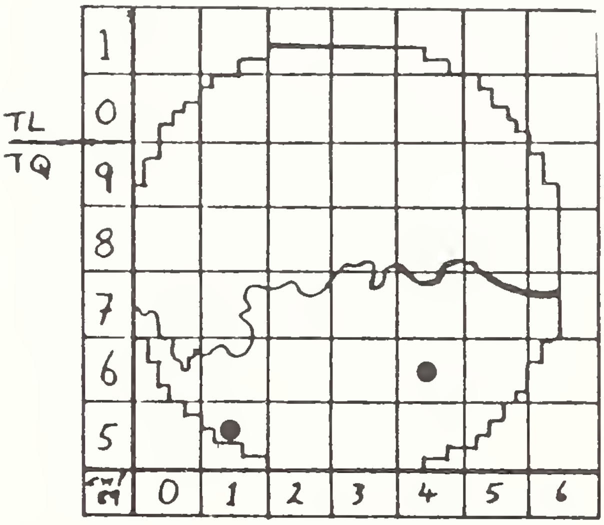
Map 2. *Atlantoraphidia maculicollis*



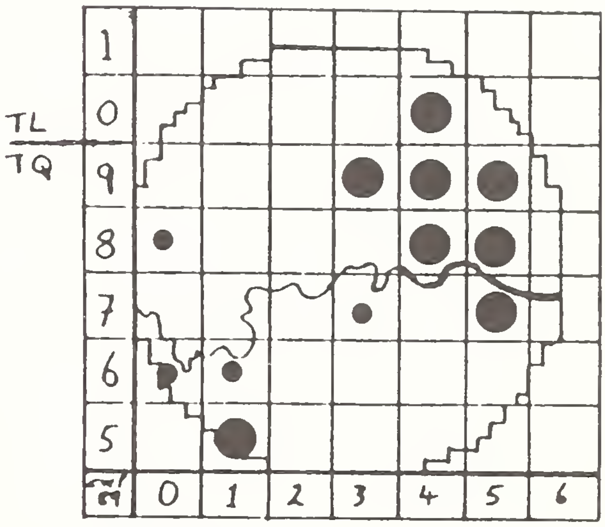
Map 3. *Phaeostigma notata*



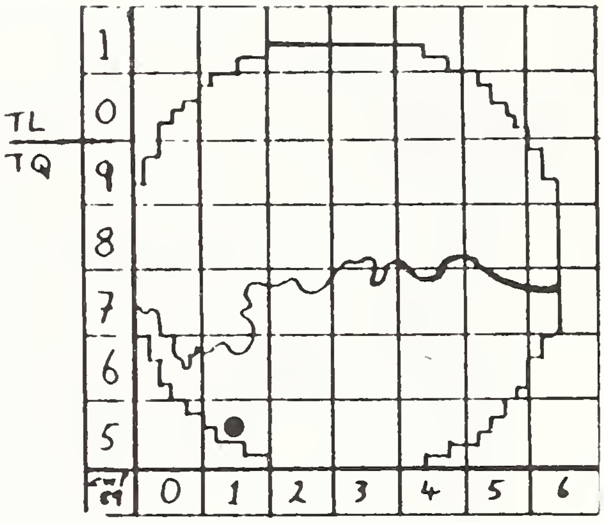
Map 4. *Xanthostigma xanthostigma*



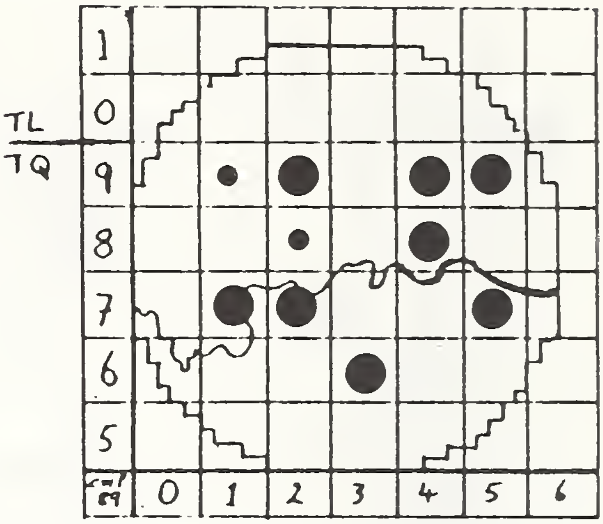
Map 5. *Sialis fuliginosa*



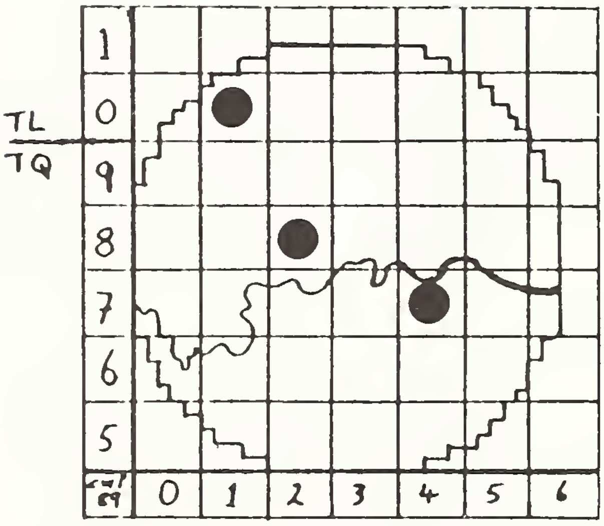
Map 6. *Sialis lutaria*



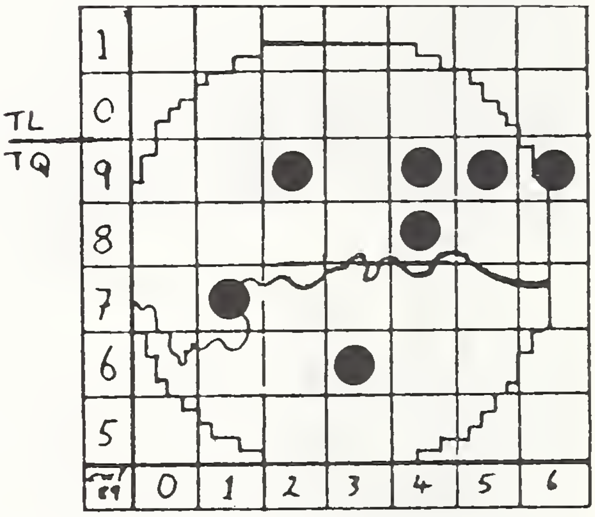
Map 7. *Sialis nigripes*



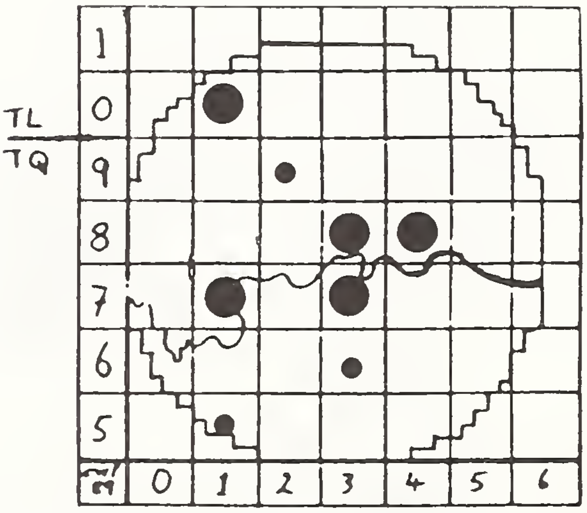
Map 8. *Conwentzia psociformis*



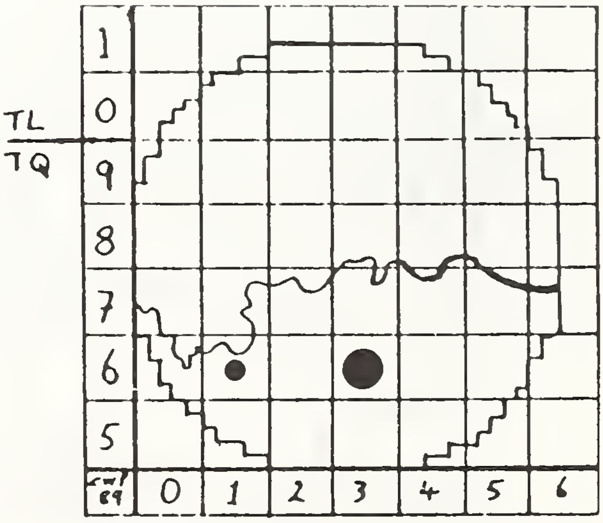
Map 9. *Conwentzia pineticola*



Map 10. *Coniopteryx tineiformis*



Map 11. *Coniopteryx borealis*



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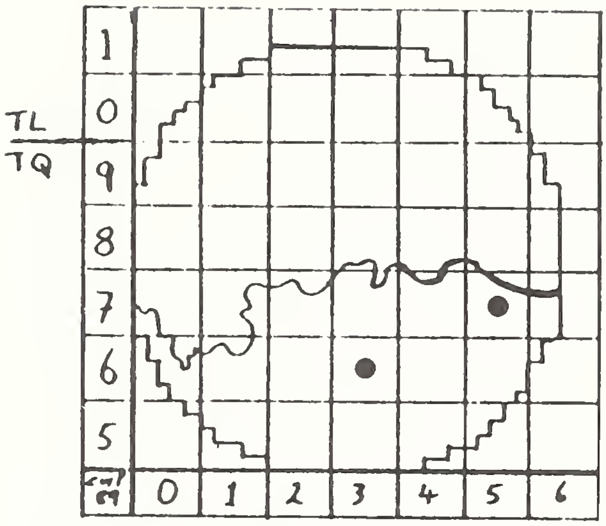
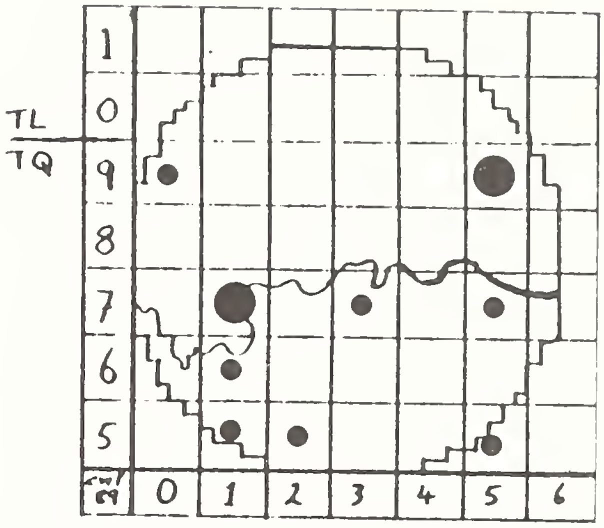
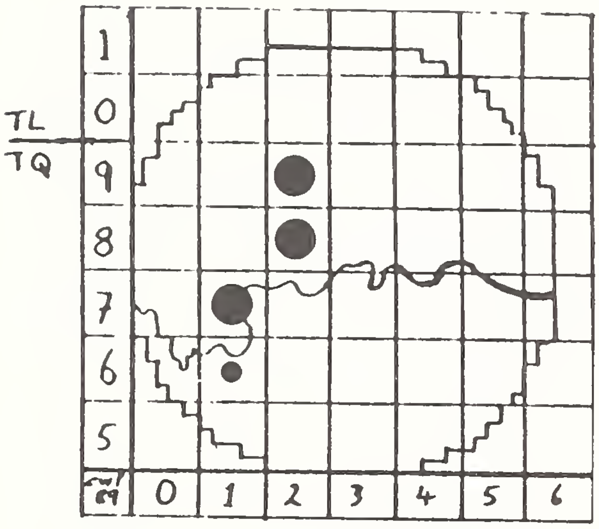


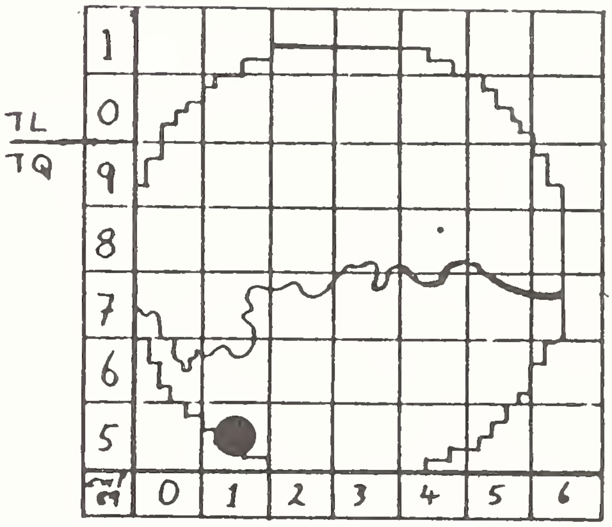
Map 13. *Coniopteryx esbenpeterseni*



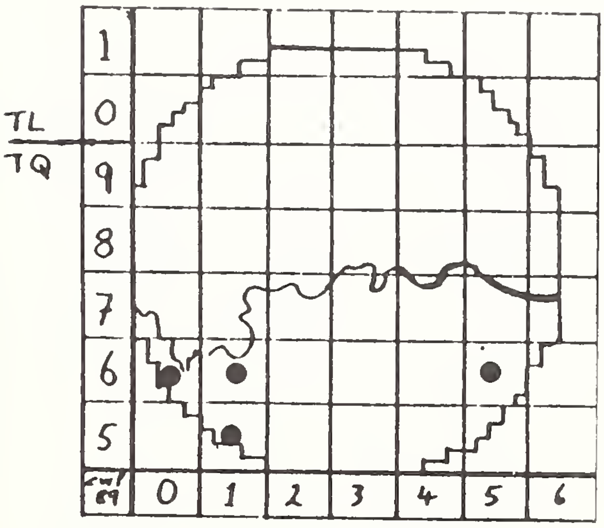
Map 14. *Semidalis aleyrodiformis*



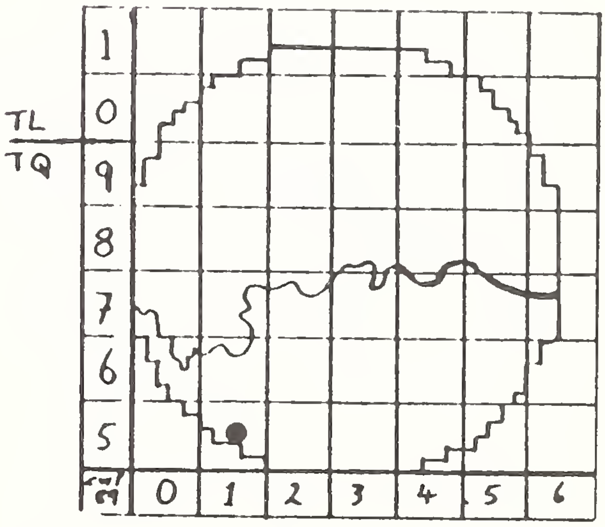
Map 15. *Parasemidalis fuscipennis*



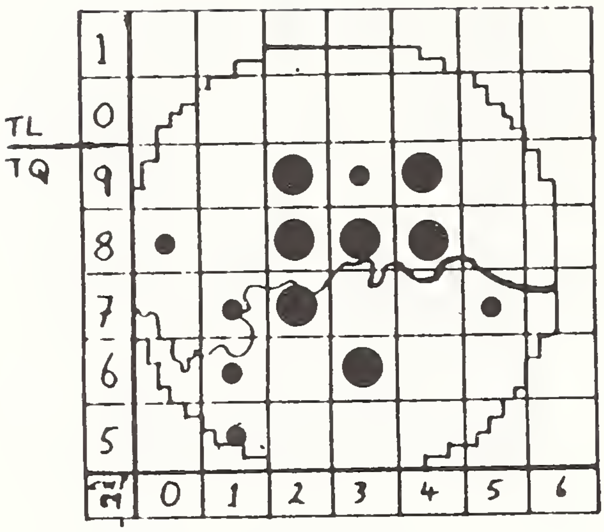
Map 16. *Aleuropteryx juniperi*



Map 17. *Osmylus fulvicephalus*



Map 18. *Sisyra dalii*



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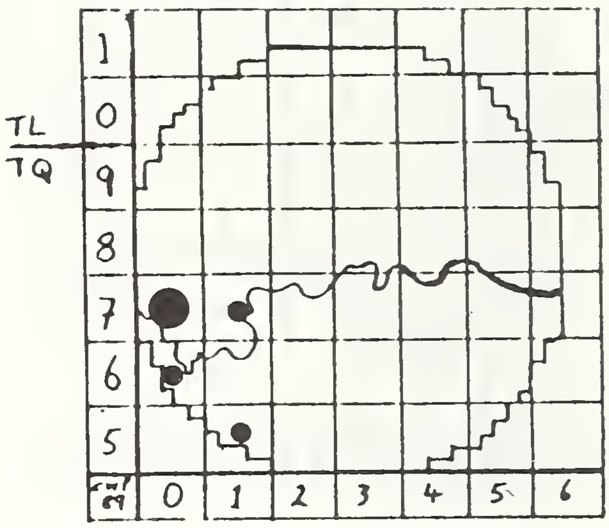
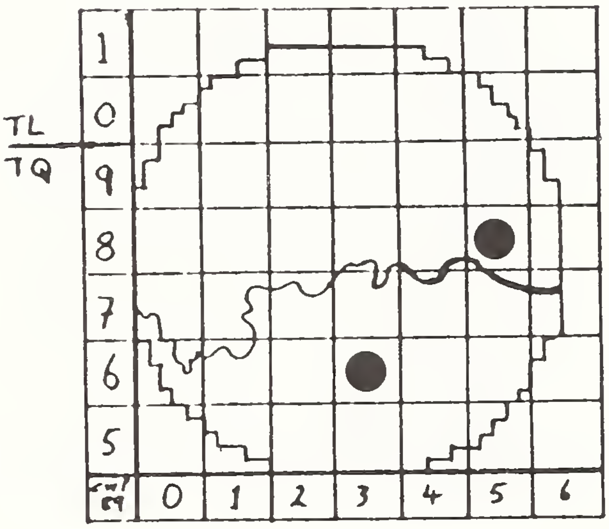
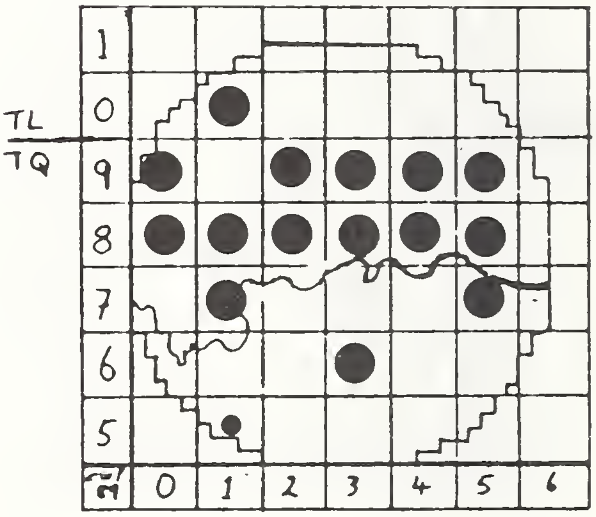


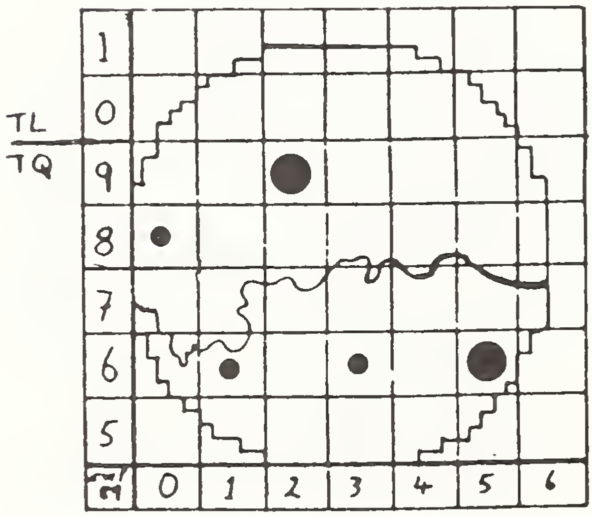
Map 20. *Sisyra terminalis*



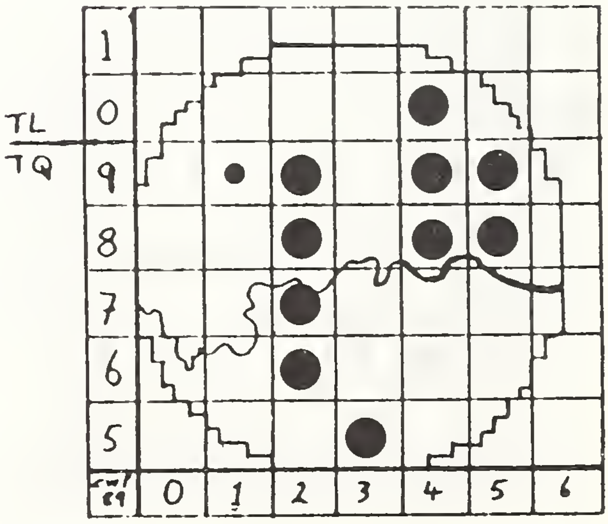
Map 21. *Psectra diptera*



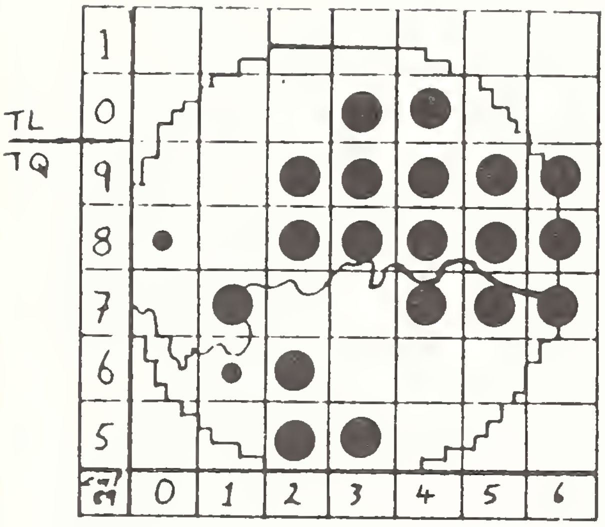
Map 22. *Micromus variegatus*



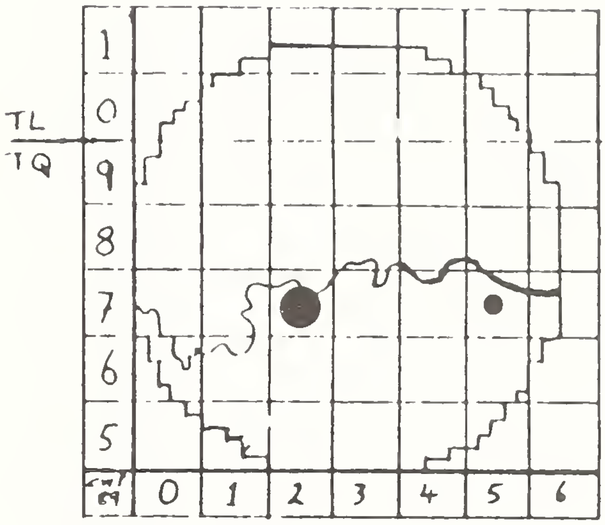
Map 23. *Micromus angulatus*



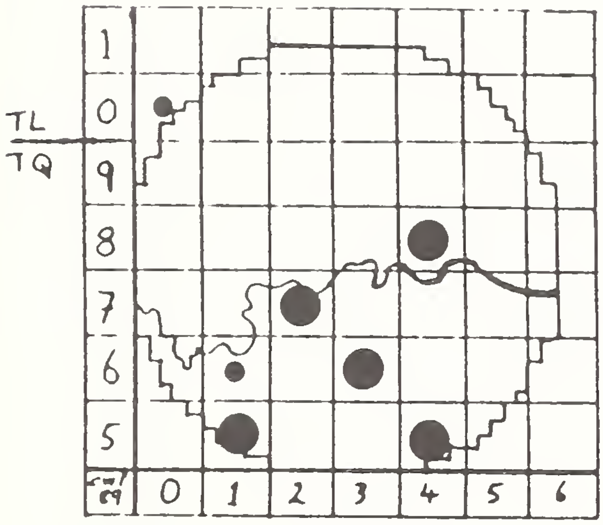
Map 24. *Micromus paganus*



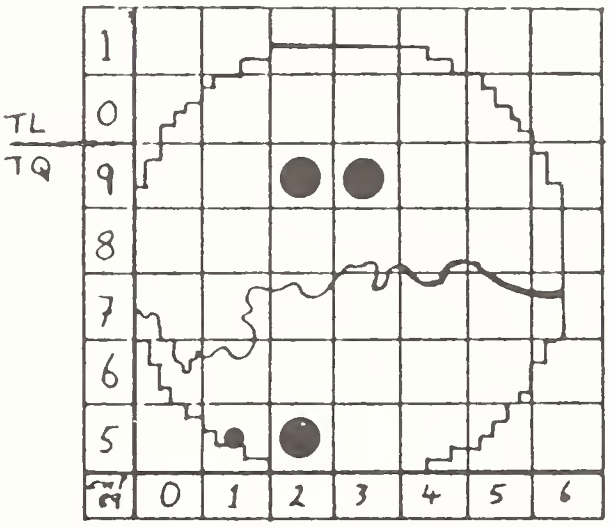
Map 25. *Hemerobius humulinus*



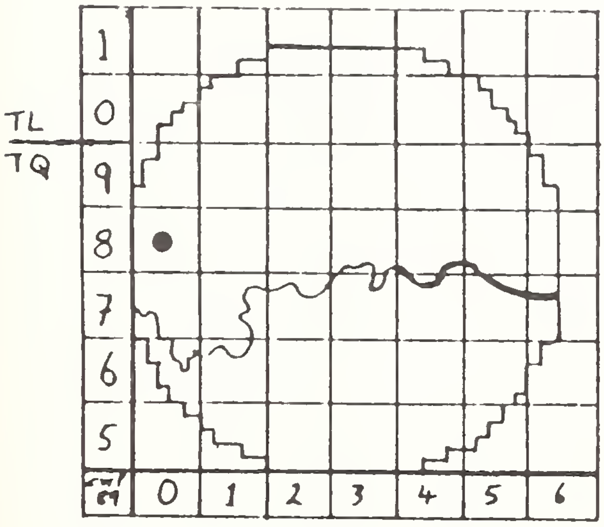
Map 26. *Hemerobius simulans*



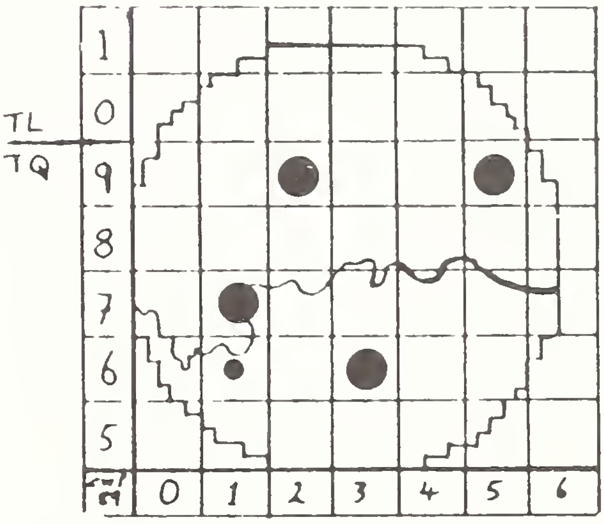
Map 27. *Hemerobius stigma*



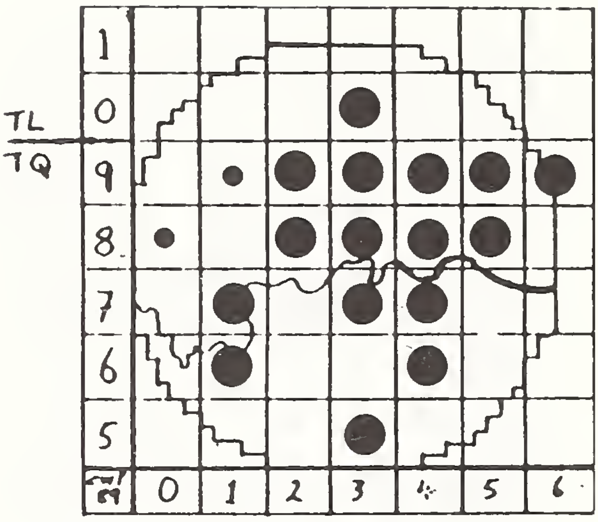
Map 28. *Hemerobius pini*



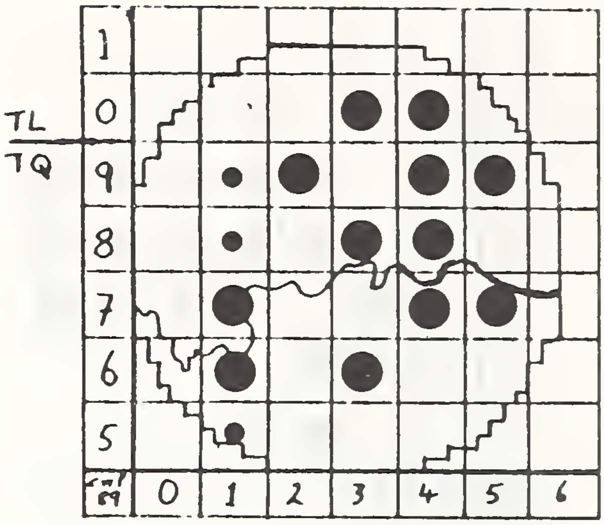
Map 29. *Hemerobius contumax*



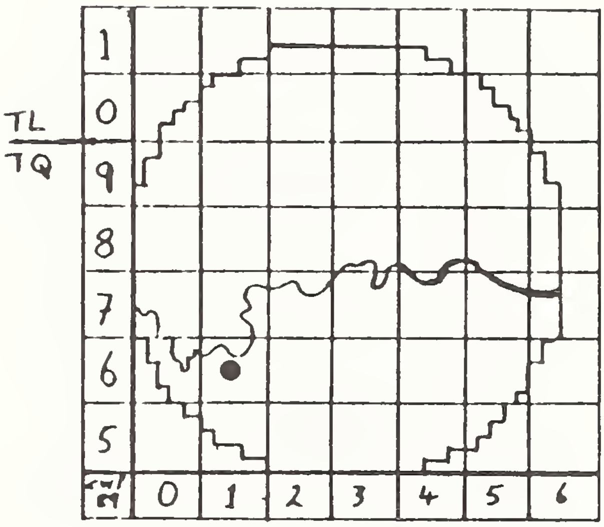
Map 30. *Hemerobius nitidulus*



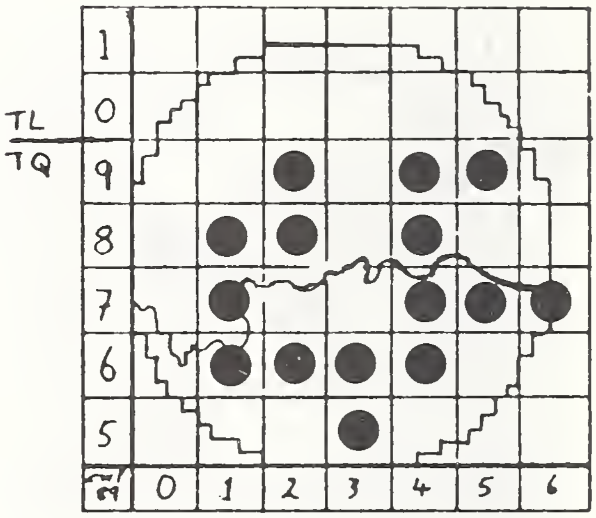
MAP 31. *Hemerobius micans*



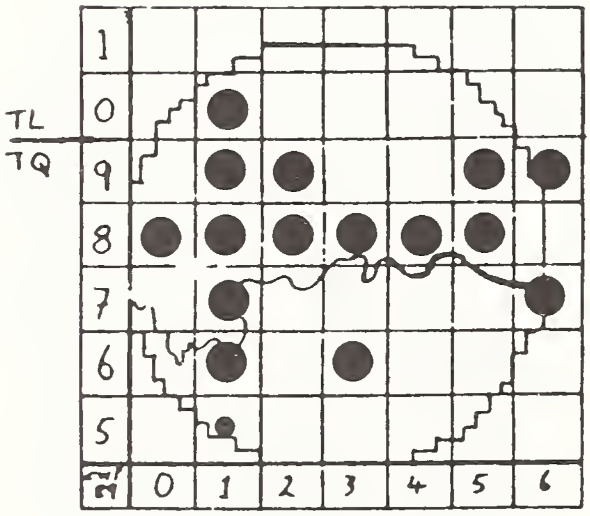
MAP 32. *Hemerobius lutescens*



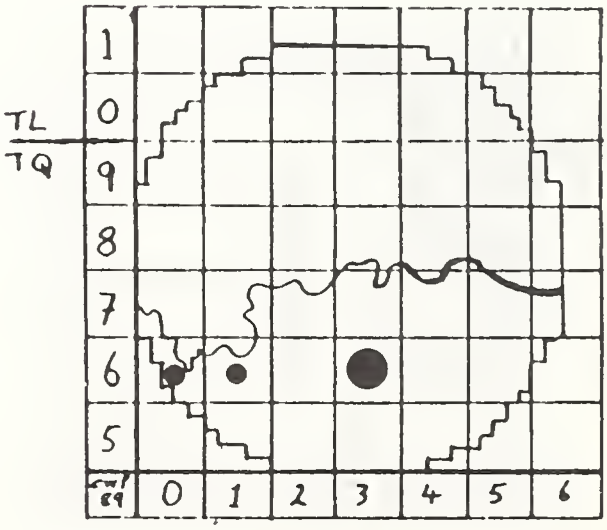
MAP 33. *Wesmaelius ravus*



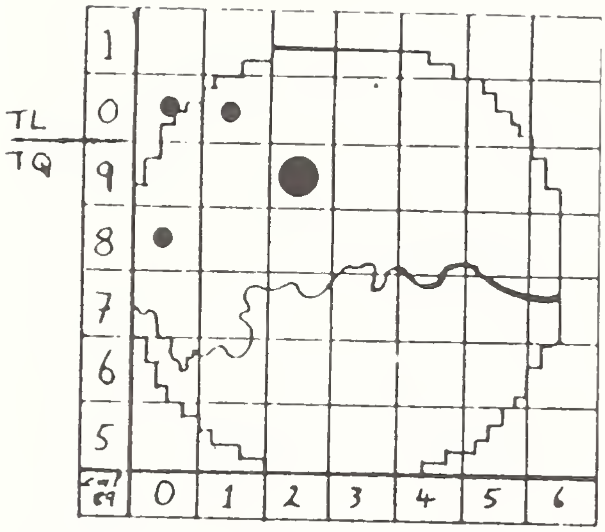
MAP 34. *Wesmaelius betulinus*



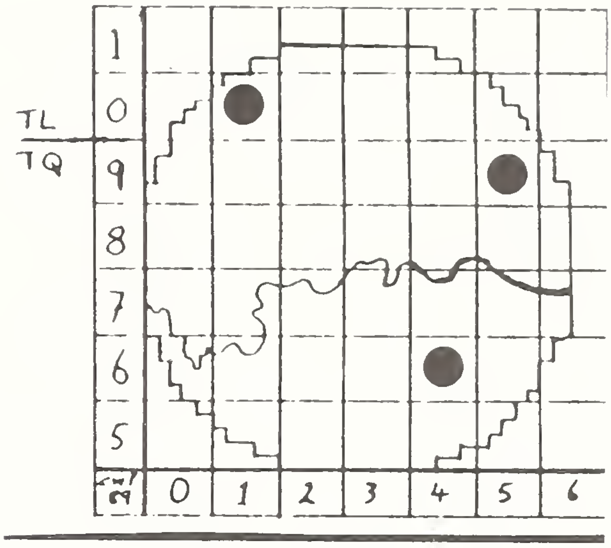
MAP 35. *Wesmaelius subnebulosus*



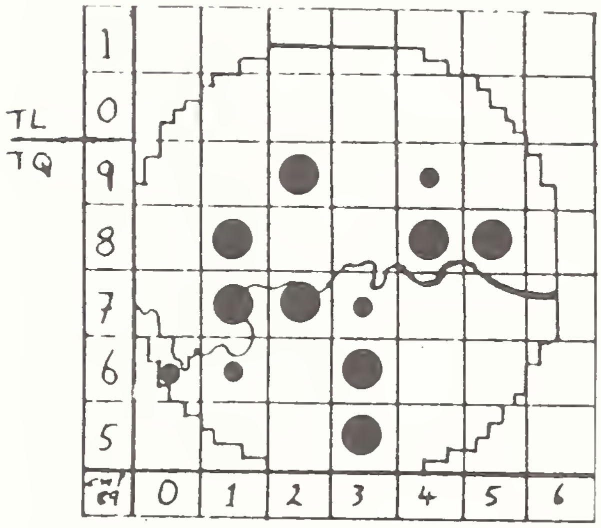
MAP 36. *Wesmaelius concinnus*



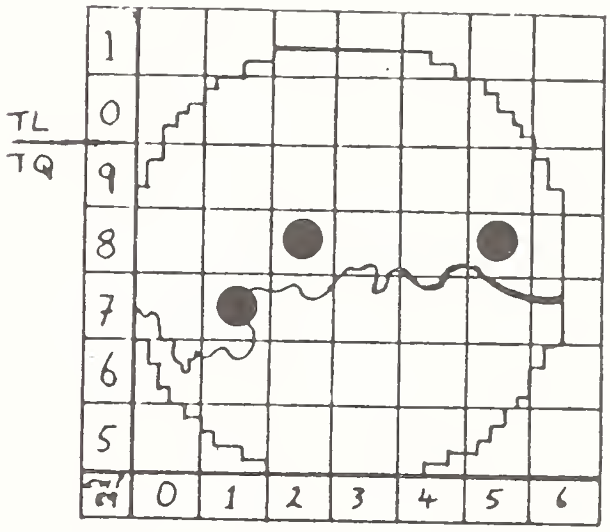
Map 37. *Wesmaelius quadrifasciatus*



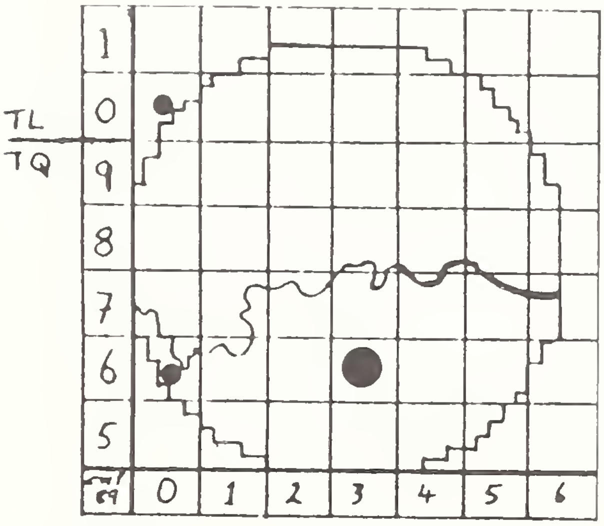
Map 38. *Sympherobius elegans*



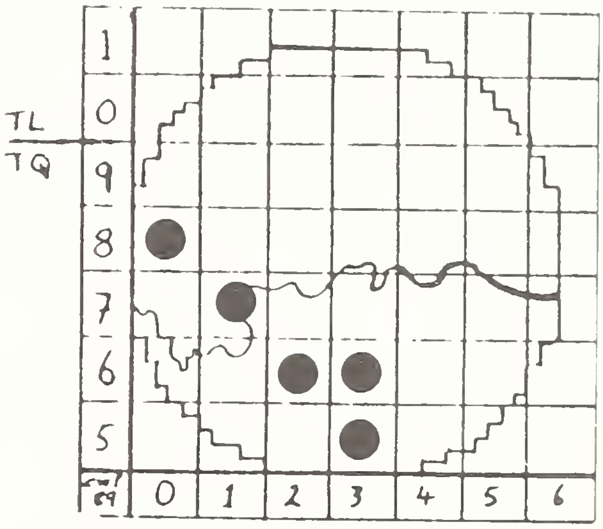
Map 39. *Sympherobius pygmaeus*



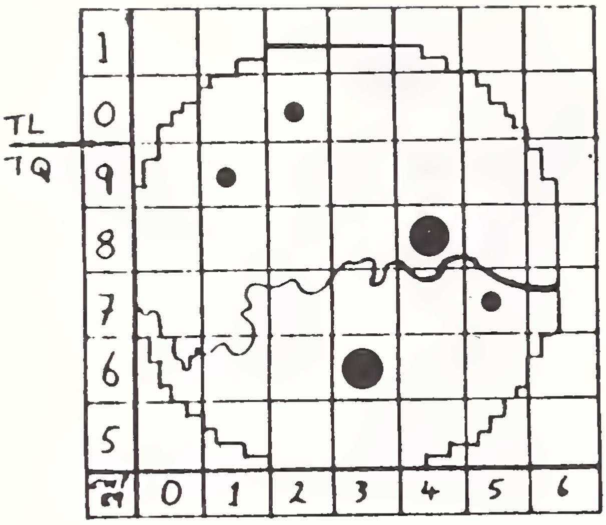
Map 40. *Sympherobius pellucidus*



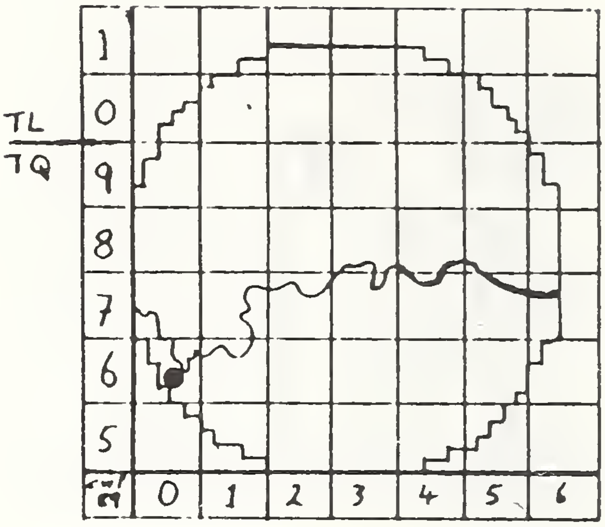
Map 41. *Sympherobius fuscescens*



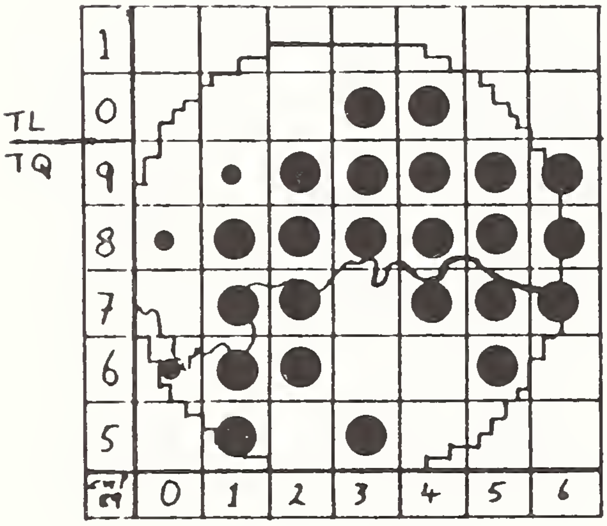
Map 42. *Drepanepteryx phalaenoides*



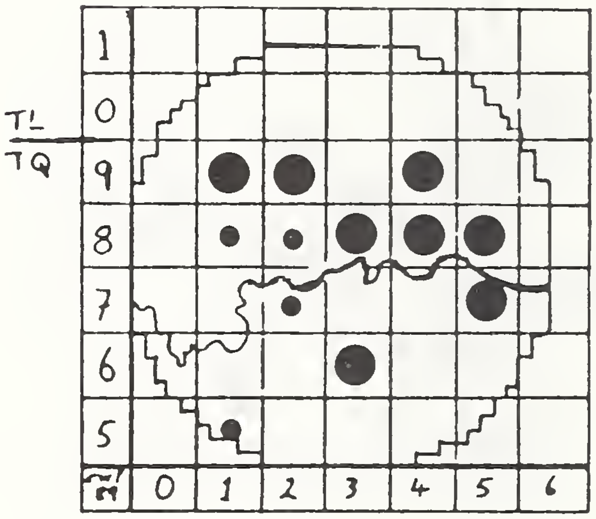
Map 43. *Chrysopa commata*



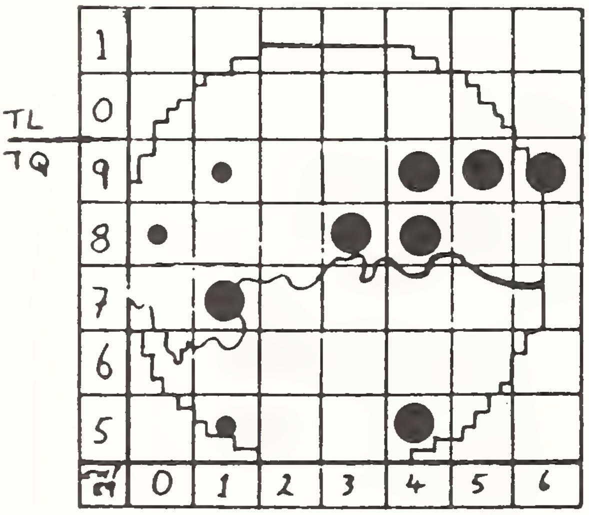
Map 44. *Chrysopa dorsalis*



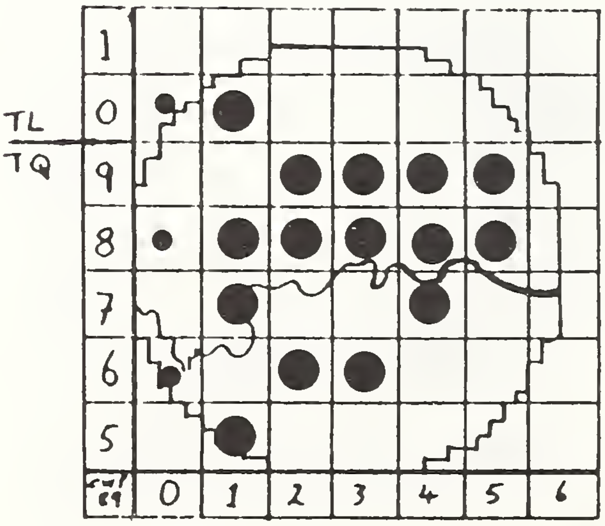
Map 45. *Chrysopa perla*



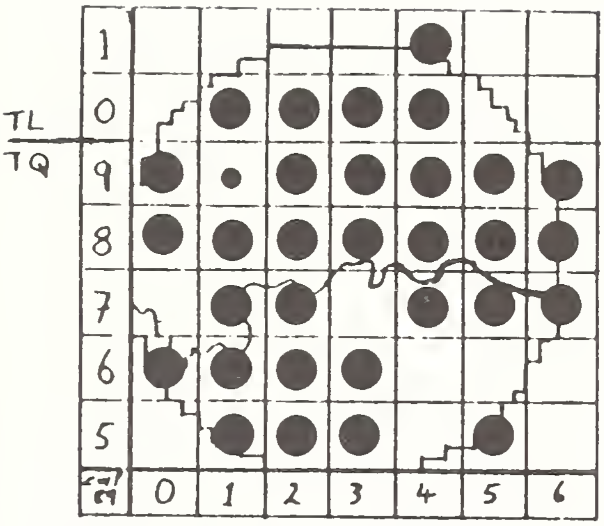
Map 46. *Chrysopa pallens*



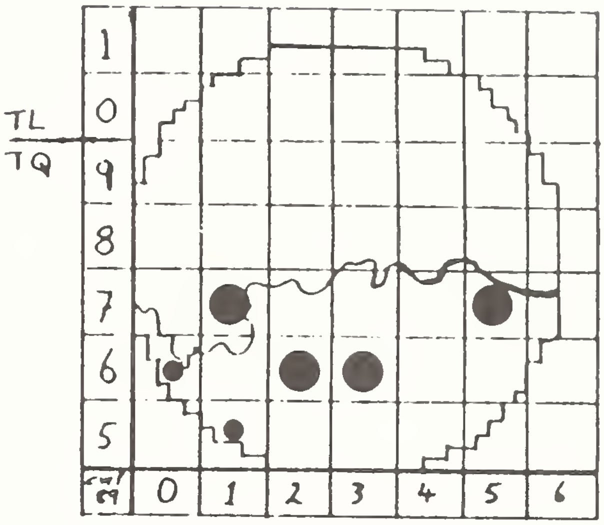
Map 47. *Chrysopidia ciliata*



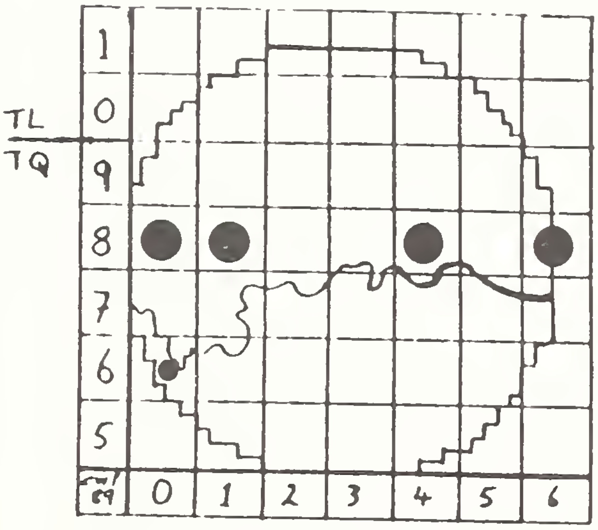
Map 48. *Cunctochrysa albolineata*



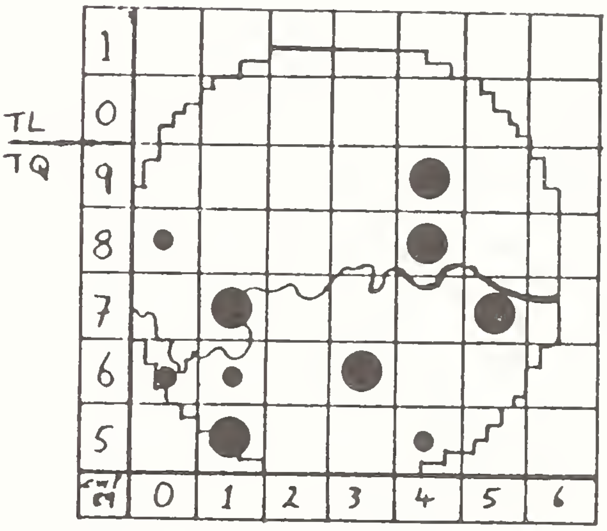
Map 49. *Chrysoperla carnea*



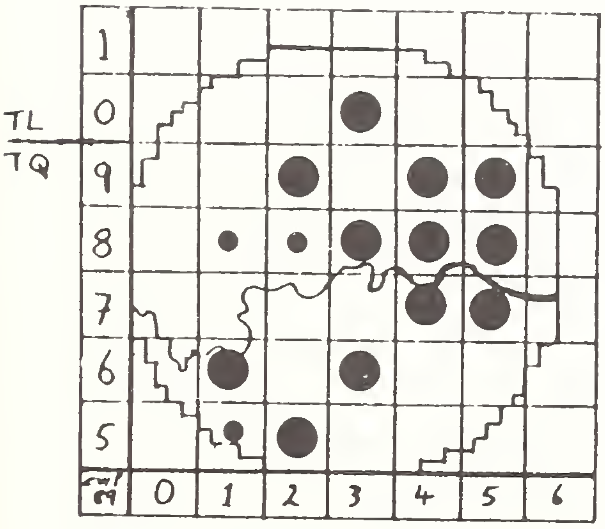
Map 50. *Mallada flavifrons*



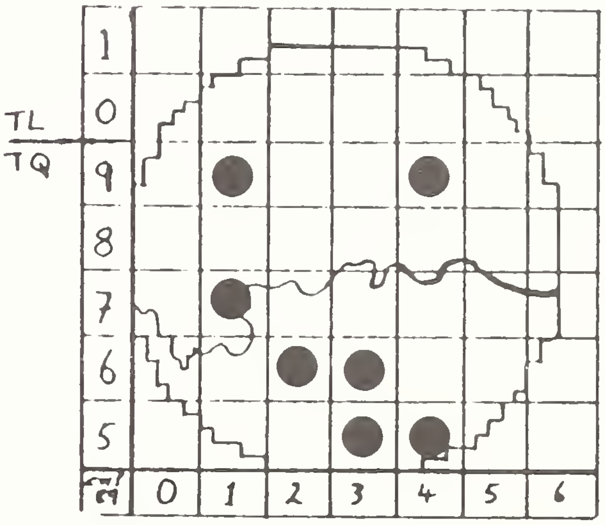
Map 51. *Mallada prasina*



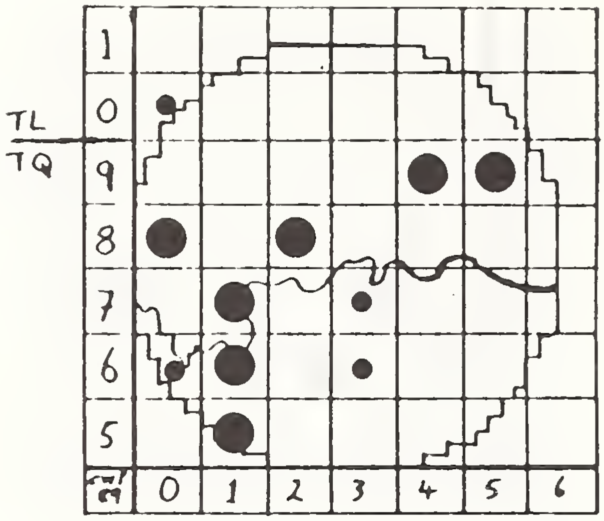
Map 52. *Mallada ventralis*



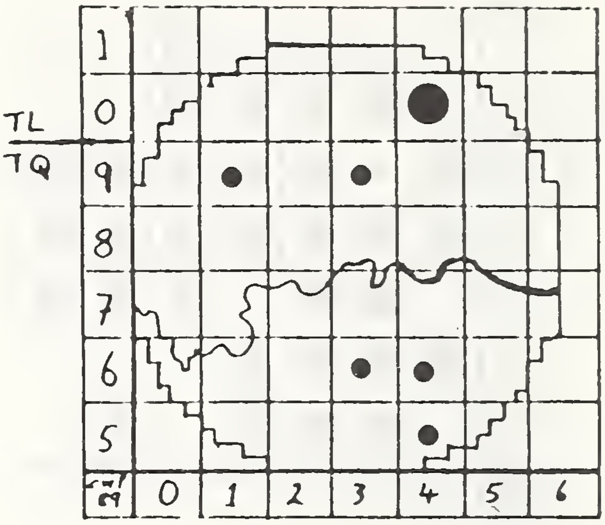
Map 53. *Nineta flava*



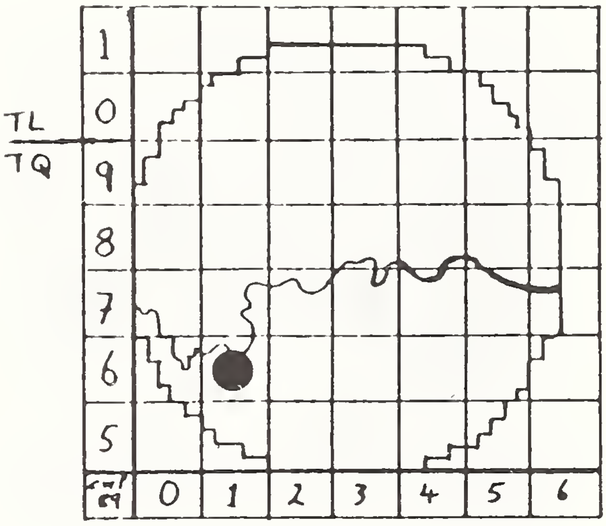
Map 54. *Nineta vittata*



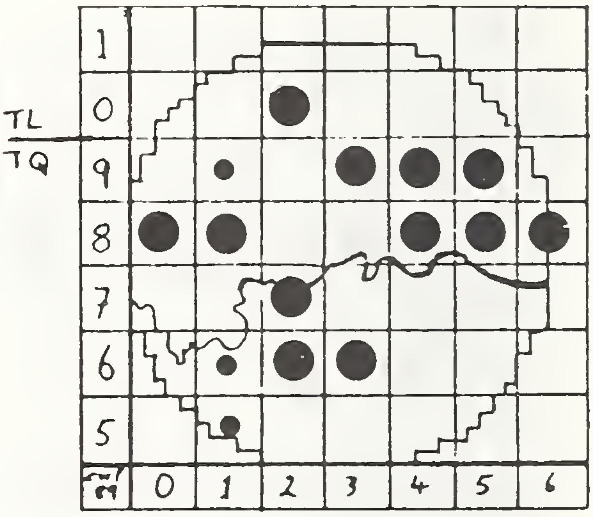
Map 55. *Nothochrysa capitata*



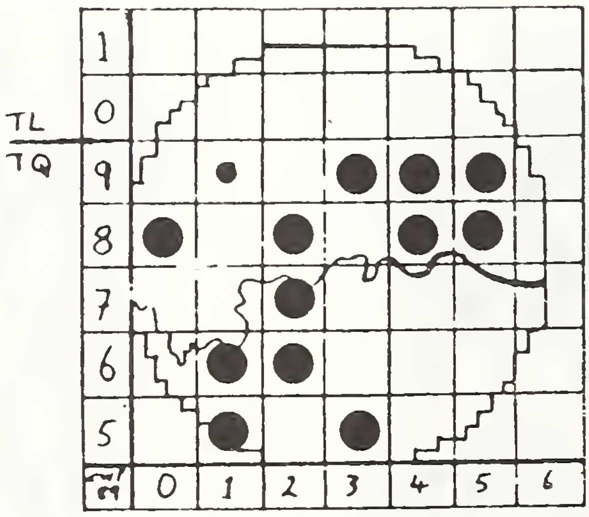
Map 56. *Boreus hyemalis*



Map 57. *Panorpa cognata*



Map 58. *Panorpa communis*



Map 59. *Panorpa germanica*

Bumblebees of the Genera *Bombus* and *Psithyrus* and Their Forage Plants in a Middlesex Garden, 1984-1989

By Shirley Goodwin*

Summary

The plants visited by six *Bombus* species and three *Psithyrus* species were recorded during a six-year study. There was a total of 88 plant species and the flowering phenology of 31 of these, which were major foraging plants, was recorded over a two-year period. The number of plants in flower each week is related to mean temperature and rainfall. The foraging preferences of the bumblebees is discussed and the number of plant species they visited is related to the length of bumblebee life cycles. Flowering trees and shrubs were important sources of spring nectar and pollen and were followed by herbaceous plants from June to September. The succession of flowering plants from March to September provided food resources for the early-, mid- and long-season bumblebees to complete their life cycles.

Introduction

The distribution of bumblebees was recorded by the Bumblebee Distribution Maps Scheme (BDMS) from 1970 to 1976. The results, together with other distribution records over the last century, were published in the *Atlas of the Bumblebees of the British Isles* (Anon. 1980). The results show that of the 25 species recorded, only six were widespread and abundant. Other species were very local or had restricted or patchy distributions; and some had disappeared from localities where they have been previously recorded. Williams (1982) has shown that since the 1960s some bumblebee species have undergone a dramatic contraction in range, especially in the Midlands and southern England. It was stated that although distribution may never have been static, there may have been slow changes due to factors such as climate. It is suggested that profound deleterious changes in habitat, possibly from changes in land use, have reduced the distribution of many species.

The last 30 years have brought great changes in the way land is used and managed. Increased road and house building, drainage schemes, and intensive agricultural methods have caused the loss of valuable sites for bumblebees. There have been large reductions in heathland; in hedgerows and their associated trees, and in floristically rich grasslands. Grass and scrub habitats have been lost on the slopes of downland and hillsides, where they have been taken into cultivation. Even small areas of marginal land containing flowers and potential nest sites have been lost (Fry and Lonsdale 1991, Webb 1986, Wells and Oswald 1988). The loss of wild bees is also attributed to the use of toxic sprays: the insecticides directly affecting the bees and the herbicides killing the plants and depriving bees of their food source (Else *et al.* 1979).

Bumblebees need sunlit areas in undisturbed grassland, hedgerows, banks and open woodland in which to nest and hibernate, and which will provide an unbroken supply of flowers. Unlike honeybees, bumblebees do not store large amounts of food and cannot survive more than a few days without replenishing their stores (Sladen 1912, Heinrich 1979). In some localities there are nectar and pollen shortages during the first two or three weeks of June (Howes 1945, Percival 1965). Also, environmental conditions, time of day, age of the plant and competition from other insects affect the sugar concentration and quantity of nectar, and also the availability and quantity of pollen (Percival 1965, Corbet 1978). However, bumblebees are able to utilise a wide range of flowers as their

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relatively long tongues give them access to nectaries in longer tubular flowers. From spring onwards, bumblebees require a continuous source of nectar and pollen for the length of their life cycles. This varies from three to six months for different species (Alford 1975).

Bumblebees are social insects and each successful *Bombus* queen produces a colony of bees. The size of a colony at its peak varies between species from about 30 to several hundred bees, and is influenced by environmental conditions. A queen emerges from hibernation in spring and establishes a nest in which to lay her eggs. Female worker bees develop from the early batches of eggs and the first adults emerge in late spring. These workers help to provision the nest and care for successive larval broods. The number of bees increases until the population reaches a peak at the time the new queens and males emerge from their cocoons. The new queens are the only bumblebees who survive from the annual *Bombus* colonies. The remaining occupants die at the end of the season while the inseminated young queens go on to breed the following year (Alford 1975). The building phase in the colony cycle is the time of greatest need of pollen for the larval broods. Also, nectar is required in increasing quantities for the adult population.

This paper describes the plant species visited by bumblebees. The number of plant species is related to the length of bumblebee life cycles. Some plant species were of major foraging importance and the number of these in flower each week is related to mean temperature and rainfall. Brood rearing is related to food resources and to the flowering continuity of the major forage plants.

Methods

Bumblebees and their plants

Identification of bumblebee species was made by observing the different coat colours. Where the sexes in *Bombus* species are similarly coloured they were either separated by different physical characters or by the presence of pollen loads which are only carried by females. No distinction was made between the sexes in *Psithyrus* species, except in the spring when only females are present.

Six species of *Bombus* visited the garden: *B. hortorum, B. lapidarius, B. lucorum, B. pascuorum, B. pratorum* and *B. terrestris.* These are the six species that were identified in the BDMS survey as being the only ones that were widespread and abundant. Data relating to *B. lucorum* and *B. terrestris* are often included together by authors because the colours of female workers are almost identical, although queens are distinct. *B. lucorum* males are more brightly coloured than the queen while *B. terrestris* males are similarly coloured. However, the colours of the males of these two species are distinct. In the observations recorded here, the end of the abdomen, or 'tail', of *B. terrestris* workers and males was usually white, although occasionally it was slightly pinky beige. *B. lucorum* workers had white tails similar to the queen. There were three species of *Psithyrus: P. campestris, P. sylvestris* and *P. vestalis.* These are cuckoo bumblebees which do not form their own colonies and have no worker caste. They are social parasites of *Bombus* species and are never as numerous as their respective hosts.

From 1984 to 1989 bumblebees were seen foraging on 88 species of garden plants. Thirty-one of these plant species were visited more frequently and by greater numbers of bees. During 1987 and 1988 the flowering times of these 31 plants were recorded. Plants include ornamental trees and shrubs, hard and soft fruit, and herbaceous species including some vegetables. Observations commenced when the first *Bombus* queens emerged from hibernation in spring, occasionally as early as late February, and continued until the last of the bees disappeared, usually in October. The flora was recorded separately for each *Bombus* and *Psithyrus* species, and for males and females of *Bombus* spp. Records for *B. terrestris* included queens, males and the workers with slightly pinky-beige tails. However, white-tailed *B. terrestris* workers were recorded with *B. lucorum*.

The number of plant species visited by each species of bumblebee was divided by the mean length of the life cycle. This gives an index showing the degree to which bees exploited the flora. When many plant species are visited during a long cycle, the index is low; when a few plants are visited during a long cycle, the index is very low; when many plants are visited in a short cycle, the index is high. The lengths of bumblebee life cycles were recorded from 1985 to 1989. The lengths of colony cycles for *Bombus* species were calculated from the time the workers emerged; while for *Psithyrus*, the male life cycles were used.

The site and climate

The site on which the garden is situated was part of an expanse of arable land in 1635 (Anon. 1972). However, on the Ordnance Survey map of 1920 this same area is shown occupied by orchards. The dwelling on the study site and neighbouring dwellings were built during the 1930s and the remaining orchards to the north survived until the early 1970s (personal observation). The garden is approximately 500 m^2 and is 50 m long and 10 m wide: it is one of several and together they occupy about 0.5 ha. The garden is sheltered: the dwelling is to the south and there are trees, shrubs and fences to the north, east and west. Beyond the north boundary fence, a narrow stream runs west to east and is fenced along its length on both sides. Its narrow banks are lined with mature trees and shrubs including *Salix alba* and *S. chrysocoma* which are important early food sources for bees. This bankside vegetation, together with flowering trees and shrubs in the gardens, provides numerous sources of nectar and pollen in spring. Relatively undisturbed areas for nesting and hibernation can be found in rough areas at the bottom of some gardens and along the stream sides.

Nomenclature for bumblebees follows Alford (1975) and that of wild flowers, Rose (1981). Nomenclature for trees follows Mitchell and Wilkinson (1982) and for fruits and vegetables, Masefield *et al.* (1969). Shrubs and herbaceous plants were identified from the catalogues of Bressingham Gardens, Norfolk, local garden centres and Titchmarsh (1983). Mean temperatures and rainfall were calculated weekly from data in the 'Monthly Weather Summaries' for Central London for 1987 and 1988 published by the Meteorological Office.

Results

Bumblebee forage is recorded in Table 1. Of the 88 species of plants, two were trees, 20 were shrubs, two were climbers and 64 were herbaceous. The most important forage plants are asterisked. Bumblebees were more numerous or more frequently observed on these plants.

Trees and shrubs

Spring heathers, *Erica* and *Carnea* spp., were in full flower when the first *Bombus* queens emerged from hibernation, but the bees were only occasionally seen on them. However, bumblebees were frequently seen on three early flowering shrubs. These were *Chaenomeles speciosa* and *Ribes sanguineum* which flowered in early March, followed by *Mahonia aquifolium* later in the month. In April, a Japanese flowering crab apple *Malus floribunda* covered itself in blossom, and insects hovered about the canopy. Bees recorded on it will be underestimated as the species of a bumblebee overhead cannot be discerned against a bright sky. Other trees included the domestic apple *M. domestica*, of which there was one standard and three dwarf trees. In addition, there were several fruit trees in neighbouring gardens and together these provided an abundance of forage during April and May. By mid to late May the shrubs of *Weigela florida* and *Cotoneaster* spp. were flowering. Four bumblebee species visited *W. florida* (Table 1), but *Bombus pascuorum* was the most frequent visitor. *Cotoneaster* spp. were visited by particularly large numbers of bumblebees, especially those of *B. pratorum* whose population peaked in June. At the end of May, *Pyracantha atalantoides* came into flower and was visited by all six *Bombus* species. *B. lucorum* and *B. terrestris* were the most numerous. *Rubus fruticosus* flowered in June and early July and was visited by bees more frequently in some years than in others. *Hebe* sp. and *Lavandula* spp. flowered during July and August. Three bumblebee species visited *Hebe*, but *B. lapidarius* was by far the most frequent. Bumblebees foraged on *Lavandula* for most of the day. They were: *B. lucorum, B. lapidarius, B. pascuorum, B. terrestris* and *Psithyrus vestalis*. Of the 10 species of shrubs which were important forage plants, eight were tall to medium in size. They were *Chaenomeles speciosa* (3), *Cotoneaster* spp. (4), *Mahonia aquifolium* (2), *Pyracantha atalantoides* (2), *Ribes sanguineum* (1), *Rubus fruticosus* agg. (1), *R. loganbaccus* (2) and *Weigela florida* (1). Two shrubs were low growing. These were *Hebe* sp. (3) and *Lavandula* spp. (6). The flowering periods of shrubs overlapped, starting in late February or March and continuing until mid July in 1987 and the end of June in 1988. *B. hortorum* was the only bumblebee observed foraging on the honeysuckle *Lonicera halleana*. The relatively long tongue of this bee enables it to reach the nectar in the long-spurred flowers.

Herbaceous plants

An important early source of forage was the red dead nettle *Lamium purpureum* which sometimes flowered as early as February. Four bumblebee species foraged on this plant, but the most frequent was *Bombus pascuorum* (Table 1). This bee also occasionally visited the forgetmenot *Myosotis arvensis* which flowered in April and May. There were three large plants of *Pentaglottis sempervirens* and its long flowering period extended from early May until early July. It was an important forage plant for *B. lapidarius, B. pascuorum* and *B. pratorum*. An extremely large plant of the Russian comfrey *Symphytum uplandicum* flowered from the end of May until mid July. Four bumblebee species foraged on this plant and a few bees could be observed on it most of the day. The most numerous of these were *B. pascuorum* and *B. pratorum*. By early summer the bees were frequently observed on *Salvia officinalis* and *Scabiosa rumelica*. *Salvia officinalis*, the culinary sage, usually had some *B. pascuorum* foragers on it throughout the day. *Scabiosa rumelica* had numerous visitors later in its long flowering season and *B. lucorum* and *B. pascuorum* were the most frequent. In July this plant was also visited by the three *Psithyrus* species *P. campestris, P. sylvestris* and *P. vestalis*. The different species of *Allium* only flowered in small quantities, but they provided a succession of flowers from May until late July. These plants were often visited by bumblebees, but not in large numbers. The most frequent visitors were workers of *B. lapidarius* and males and females of *B. pratorum*. Large quantities of flowers on tall, dense spikes were provided by *Digitalis purpurea* and *Delphinium elatum*, flowering in June and early July. *B. hortorum* and *B. pascuorum* were the only bumblebees observed foraging on these flowers, the longer tongues of these bees enabling them to reach the nectar. Other important herbaceous foraging plants coming into flower later in July were *Hyssopus officinale* and *Origanum officinalis*. Throughout the day, *O. officinalis* was seldom without visitors from the four mid- and long-season bumblebees, *B. lapidarius, B. lucorum, B. pascuorum* and *B. terrestris*, and also the cuckoo bee *P. vestalis*. Several species of bumblebee visited the dense flower spikes of *Lythrum salicaria* and *Salvia superba*, flowering in July and August. *B. pascuorum* was a regular visitor to the runner bean *Phaseolus coccineus* and the tomato *Lycopersicum esculentum*.

Major forage plants

Bumblebees were more numerous and foraged more frequently on the 31 plant species which are asterisked in Table 1. *Allium* spp. have been included as a group. The flowering times of these 31 species were recorded from March to September in 1987 and 1988, and the number of species in flower each week is shown in Figure 1. It can be seen that the number varied slightly each year. In April there were 5-11 tree and shrub species in flower, in May, 4-8 species and in June, 1-6 species. As trees and shrubs ceased flowering in June, the herbaceous plants became increasingly important as food sources: 14-17 herbaceous species flowered in June. During July and August there were 12-20 herbaceous species in flower and these decreased to three or four species by the end of September.

Figure 1 also shows the mean maximum temperatures in 1987 and 1988. Daytime temperatures were relatively low in March 1987 and this is reflected

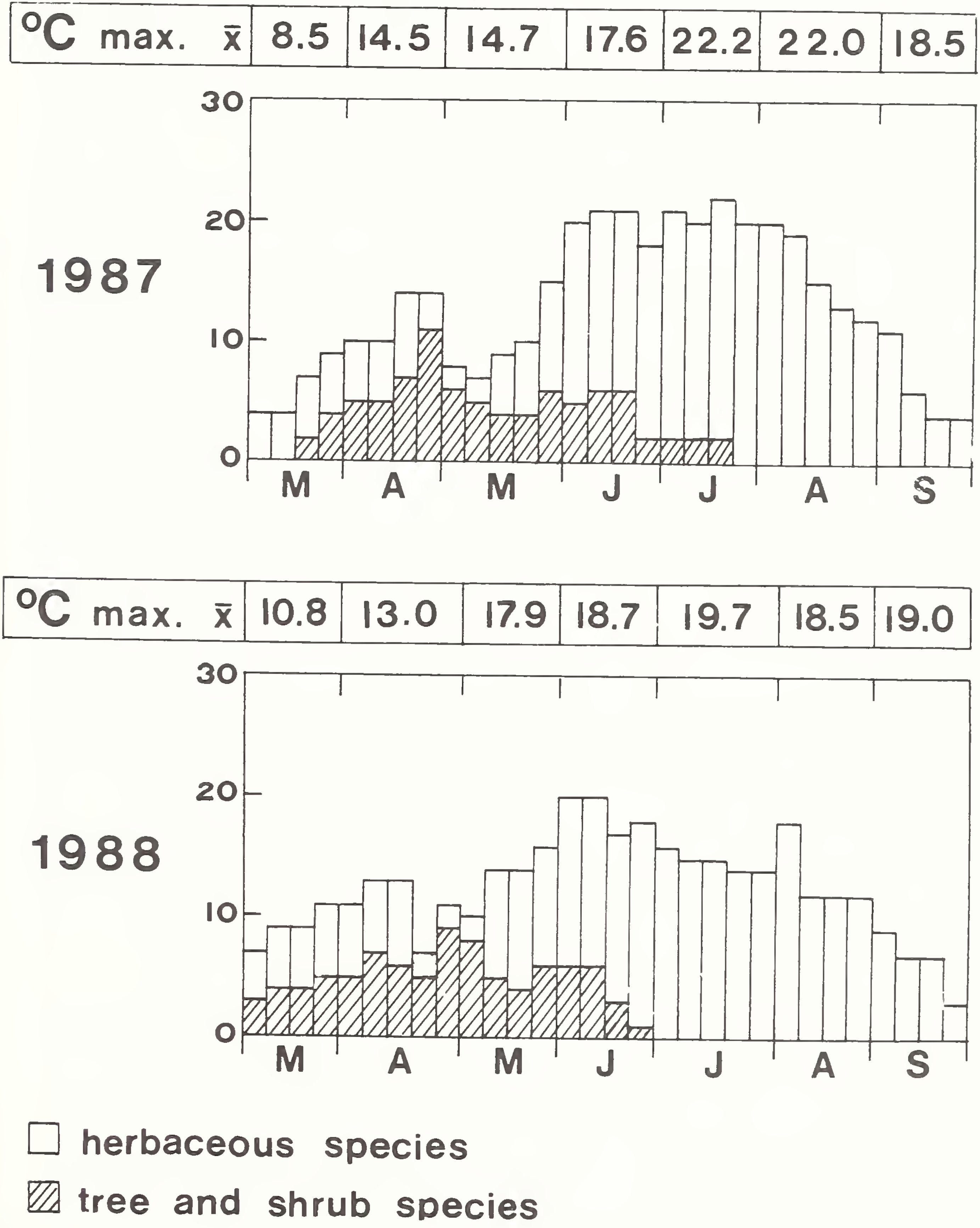

FIG. 1. Flowering time of 31 species of plants on which bees foraged in greater numbers (see Table 1). Shown as the number of species in flower each week from March to September 1987 and 1988, together with mean temperatures.

in the lower number of plant species in flower compared with March 1988 which had a higher mean temperature. The situation is reversed for April: 1987 has both higher temperature and greater number of plants in flower compared with 1988. This pattern of increase or decrease for both temperature and plant species in flower within the same month is also clearly shown for May, July and August. The slightly higher number of herbaceous species in flower in July and early August 1987 is possibly due to higher rainfall as well as higher temperatures. Rainfall for June and July 1987 was 174.2mm which was almost twice the average for these months, providing 188 per cent of normal rainfall for June and 200 per cent for July. During June and July 1988 the rainfall was 91.0mm, being 65 per cent of the normal rainfall for June and 140 per cent for July. The June rainfall occurred in the first half of the month and the third and fourth weeks were dry. Figure 1 shows there were fewer plant species in flower for these last two weeks. In dry periods the plants actually in flower were slightly irrigated, but this was not done on a large scale.

Food resources and brood rearing

During early spring, *Bombus* queens, recently emerged from hibernation, make only small demands on food resources. They forage for pollen and nectar for their own needs while they search for a nest site. By mid March and early April many queens are collecting pollen for their first broods and the demand on food resources slowly increases.

In my own study the population of *Bombus pratorum* peaked by mid June and that of *B. hortorum* in late June. These species need reliable food supplies for the developing broods of their next reproductive generation and this occurred from late March to mid May. This coincides with the flowering of trees and many shrubs (Figure 1). The blossom of these plants was in massed quantities and must have been far in excess of that provided by herbaceous plants during summer. Therefore, these early bumblebees had good potential food sources for their reproductive broods. The bumblebees whose colonies mature later in the season were rearing their first broods of workers at this time. The increased food requirements for the reproductive broods of the mid-season *B. lapidarius, B. lucorum* and *B. terrestris* was approximately from mid May to the end of June. During June the last shrubs gradually ceased flowering, but the number of herbaceous species coming into flower rapidly increased. The mid-season bumblebees therefore had food sources for their broods. Increased food supplies were required by the long-season *B. pascuorum* from early June until early August and Figure 1 shows that herbaceous plants provided numerous food sources during this time: 17-21 plant species flowered in June, including shrubs, 14-22 plant species flowered in July and 12-20 species in the first two weeks of August. There was a declining number of plants providing nectar for a declining population of adult bumblebees in late August and through September. I found that in most years there was a rapid decline in bumblebees after mid August.

Life cycle and utilization of flowers

Table 2 summarises the length of bumblebee life cycles. The number of plant species on which bumblebees foraged (Table 1) is also shown. These data have been converted to an index as previously described. This indicated how bumblebees exploited the plant species during their life cycles. The populations of *Bombus pratorum* and *B. hortorum* peaked in June and the species died out in July each year. These bumblebees therefore exploited a more limited flora compared to the longer-lived bees which may visit other plant species flowering later in the season. The mid-season *B. lapidarius, B. lucorum* and *B. terrestris* peaked in late July and died out by late August. The number of plant species and length of colony cycles for *B. lucorum* and *B. terrestris* have been combined to provide a more realistic index for *B. terrestris*. The pinky-beige-tailed *B.*

terrestris were recorded on 17 plant species, which is likely to be an underestimate. There were 28 plant species recorded for *B. lucorum* which included the white-tailed *B. terrestris* workers. When combined, these bumblebees were recorded on 34 plant species. *B. pascuorum* had a long colony cycle and in mild autumns a few individuals were still foraging in late October. The longer the life cycle the more plant species bumblebees tend to visit. However, it is the mid-season *B. lapidarius* which had the highest index of 2.6. *B. hortorum* with the shortest cycle and *B. pascuorum* with the longest cycle both had a moderately high index of 2.1. *B. lucorum* and *B. terrestris* with moderate-length cycles had a combined index of 2.0. *B. pratorum*, with the second shortest cycle, had the lowest index of 1.5. *Psithyrus* spp. were far less numerous than *Bombus* spp. *Psithyrus* females could only be clearly identified in spring and the few flowers they were observed upon are included in the data (Table 2) for male *Psithyrus*. *P. vestalis* has an index of 1.0. Males of this species were seen for 6-12 weeks and foraged on several plant species. *P. sylvestris* and *P. campestris* were seldom observed and their index is low at 0.8 and 0.7 respectively. Both species were usually seen on *Scabiosa rumelica*.

Discussion

By late February some early shrubs came into flower and provided good potential food sources within the garden for bumblebees emerging from hibernation. There were willows in the vicinity which give a valuable early source of pollen and nectar. During April and early May the blossom on ornamental and fruit-bearing trees and shrubs provided an abundance of forage for bumblebees and their early larval broods. There was a rapid increase in the bumblebee population from late May until mid June and large numbers of bees foraged on late-flowering shrubs. These shrubs were important forage plants in late May and early June together with a few early-flowering herbaceous perennials. These bridged the gap between the bulk of spring-flowering trees and shrubs and the onset of summer-flowering plants. Howes (1945) and Percival (1965) report that there are sometimes shortages of nectar and pollen for honeybees during early June, but Figure 1 shows that there was no shortage of flowering shrubs and herbaceous species for bumblebees at this time. As shrubs gradually ceased flowering the herbaceous species became the major source of bumblebee forage. The number of herbaceous species in flower remained relatively constant from July until early August when they gradually declined. Severson and Parry (1981) found the same sequence of trees, shrubs and herbaceous species in the pollen loads collected by honeybees. They found that pollen from trees was dominant in April and May, but ceased after late May. Shrubs were the next pollen sources, providing almost 60 per cent of pollen loads from late May until mid June, by which time herbaceous species became the dominant pollen source. After mid July herbaceous plants provided 100 per cent of the pollen collected by honeybees.

Large plants or those growing in clumps, usually in open or sunny places, continually attracted bees while in flower. Bumblebees foraged almost exclusively in light, open areas, and visited plants which were conspicuous. The plants stood out from the surrounding vegetation, because they were tall, dense, or their flowers were 'clumped'. Thompson (1981) states that large clumps of flowers provide 'hot spots' of floral density which attract more bees.

Although there appeared to be adequate rainfall during 1987 and 1988, the second half of June 1988 was dry with lower than normal rainfall for the month. Rainfall in July was higher than normal but there were still fewer plant species in flower during June and July compared with 1987. In drought conditions herbaceous plants wilt relatively quickly compared with trees and shrubs, and Percival (1965) states there are many reports of nectar flows failing during drought. I found that the developing broods of the mid-season bumblebees appeared to be vulnerable to the drought period in late June 1988. When these 'drought broods' were due to emerge as adults, the population should have built up to a peak, but in fact the number of adults in the population remained relatively static. This was the time of year that the next reproductive generation of the mid-season bumblebees should have emerged.

The bumblebee with the highest plant index was the mid-season *Bombus lapidarius* (Table 2). It visited almost as many plant species as the long-season *B. pascuorum*. However, *B. lapidarius* died out during August at the same time as the mid-season *B. lucorum* and *B. terrestris*. These three mid-season bumblebees have similar length tongues, but *B. lapidarius* has a slightly longer head and therefore it can reach nectar in deeper flowers, and visit more plant species, than *B. lucorum* and *B. terrestris*. Lack (1982) also found that *B. lapidarius* visited a wide range of plant species, but some were only visited occasionally. *B. hortorum*, *B. lucorum*/*B. terrestris* and *B. pascuorum* had comparable plant indices, but there is a disparity in the number of plants visited by these bumblebees and also in the length of their life cycles. *B. hortorum* visited fewer plants and had the shortest cycle. However, it has a relatively long tongue, enabling it to forage on nectar in deep flowers which are inaccessible to shorter-tongued bees. This gives *B. hortorum* a wider choice of flowers during its short cycle. *B. lucorum*/*B. terrestris*, mid-season bees, completed their cycles in August. Prys-Jones and Corbet (1987) state that the short to moderate length tongues of these bees, and their broad, short heads, restricts their choice of flowers. *B. pascuorum* visited the most plant species and has a long cycle extending into early autumn. Although this gave it the choice of visiting additional plants flowering in late summer, there is a limit to the number of plant species that a habitat can provide. *B. pratorum* usually completed its cycle by early July, but I found that the length of its colony cycle was only a little shorter than the mid-season bumblebees (Table 2). However, *B. pratorum* establishes nests early in the season and its workers are often the first to appear. This is a relatively small and short-tongued bumblebee and it had the lowest index. Although it can get inside flowers whose corollas are perhaps too narrow for the larger bees, its short tongue prevents it reaching nectar in flowers with long corollas. The cuckoo bumblebees *Psithyrus* spp. had low indices. *P. vestalis* usually congregated on only two or three plants species in any one summer, depending upon which plants were in flower while they were flying. The recorded life cycle of *P. campestris* and *P. sylvestris* is very short. They were seldom observed and were seen on very few plant species. However, Lack (1982) and Teras (1976) also found that *Psithyrus* spp. visited a narrow range of plant species.

Acknowledgement

I am grateful to M. J. Llewellyn for advice during the study and in the preparation of the manuscript.

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TABLE. 1. Plant species on which bumblebees foraged within the garden, 1984-89. Plants marked * had greater numbers of bees on them. Bees are listed according to the length of their life cycle (see Table 2).

Bumblebee species

	B. pascuorum		*B. lapidarius*		*B. lucorum*$^{a)}$		*B. terrestris*		*B. pratorum*		*B. hortorum*		*P. vestalis*	*P. sylvestris*	*P. campestris*
Plant species	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂			
TREES															
**Malus domestica* agg. apple	+		+								+				
**M. floribunda* crab apple	+						+				+				
SHRUBS															
**Chaenomeles speciosa* flowering quince	+		+						+		+				
**Cotoneaster* spp.			+						+	+				+	
Cytisus kewensis broom									+						
Erica and *Carnea* spp. heathers	+				+		+		+						
**Hebe* sp. shrubby veronica	+		+	+	+										
**Lavandula* spp. lavender	+	+	+	+	+	+		+					+		
**Mahonia aquifolium* Oregon grape			+		+		+						+		
M. japonica							+								
Osmanthus burkwoodii							+								
Philadelphus sp. mock orange											+				
**Pyracantha atalantoides* firethorn	+		+		+		+		+		+				
Rhododendron ponticum											+				
Ribes nigrum blackcurrant					+										
**R. sanguineum* flowering currant	+		+		+		+								
Rosemarinus officinalis rosemary									+						
**Rubus fruticosus* agg. blackberry	+	+			+				+	+					
**R. loganbaccus* loganberry										+					
Ruta graveolens rue	+		+												
**Weigela florida*	+		+							+	+				

	Bumblebee species														
	B. pascuorum		*B. lapidarius*		*B. lucorum*[a]		*B. terrestris*		*B. pratorum*		*B. hortorum*		*P. vestalis*	*P. sylvestris*	*P. campestris*
Plant species	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂			
CLIMBERS															
Clematis macropetala	+														
Lonicera halleana honeysuckle											+				
HERBACEOUS															
**Agastache foeniculum* anise hyssop	+	+										+	+		
**Allium cepa* onion			+		+			+							
**A. gigantea* ornamental onion									+	+					
**A. karavatiense*										+					
**A. moly*			+												
**A. schoenoprasum* chives			+												
**A. s. forescate* ornamental chives			+						+	+	+			+	
**A. sphaerocephalon* ornamental leek			+	+	+	+							+		
**Althaea rosea* hollyhock	+		+	+	+		+	+					+		
Antirrhinum majus snapdragon	+	+													
Aquilegia sp. columbine											+				
Armeria maritima thrift			+							+					
**Aster* spp. Michaelmas daisies	+	+													
Aubretia deltoidea	+						+								
Bellis perennis daisy			+												
Brassica sp. cabbage	+				+										
Calendula officinalis marigold			+								+				
Campanula carpatica bellflower			+												
C. garganica alpine bellflower			+												
C. glomerata clustered bellflower			+												
Centaurea cyanus cornflower			+												
Centranthus rubra red valerian	+				+						+				
Cynoglossum nervosum houndstongue	+														
**Delphinium elatum*	+										+	+			
**Digitalis purpurea* foxglove	+										+				
Dipsacus fullonum teasel	+	+			+	+						+	+		
Eruca sativa rocket	+		+												
Erysimum spp. wallflower	+														
Fritillaria imperialis crown imperial			+						+						
Helenium sp. sneezeweed				+		+	+								
Helianthus annuus sunflower	+														
H. multiflorus multiflowered sunflower					+										
**Heuchera sanguinea*	+								+						
Hyacinthoides non-scriptus bluebell							+			+					
**Hyssopus officinale* hyssop	+			+	+		+						+		
**Lamium purpureum* red dead-nettle	+						+				+		+		
**Ligularia clivorum*		+		+	+								+		
Lunaria annua honesty	+		+												
Lupinus polyphyllus lupin			+		+						+				
Lycopersicum esculentum tomato	+														
**Lythrum salicaria* purple loosestrife	+		+	+	+										
**Myosotis arvensis* forgetmenot	+								+						
Narcissus pseudo-narcissus daffodil	+		+								+				
Nigella damascena love-in-a-mist			+												
**Origanum officinalis* marjoram	+	+	+	+	+	+	+	+					+		
**Papaver somniferum* poppy			+		+										
**Pentaglottis sempervirens* alkanet	+		+							+					
Phaseolus coccineus runner bean	+				+		+								
Pyrethrum sp.			+												
Ranunculus repens creeping buttercup			+												

	Bumblebee species														
	B. pascuorum		*B. lapidarius*		*B. lucorum*a)		*B. terrestris*		*B. pratorum*		*B. hortorum*		*P. vestalis*	*P. sylvestris*	*P. campestris*
Plant species	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂			
Rhaphanus sativa radish			+												
**Salvia officinalis* sage	+										+				
**S. superba*	+				+	+				+			+		
Saxifraga umbrosa London pride					+										
**Scabiosa rumelica* red scabious	+	+	+	+	+	+				+			+	+	+
**Symphytum uplandicum* Russian comfrey	+			+					+	+	+				
Taraxacum officinale dandelion			+												
Teucrium scorodonia wood-sage	+														
Thymus vulgaris thyme	+														
Tradescantia virginiana					+										
Trifolium repens white clover	+			+											
Veronica gentianoides			+												
Vicia faba broad bean	+										+				
Viola tricolor heartsease	+				+										

a) including white-tailed *B. terrestris* workers

TABLE 2. The mean length of bumblebee life cycles 1985-89; the number of plant species visited 1984-89; and an index showing how the bees exploited the flora.

	Weeks	**Plant**	
	Colony cycle	**Species**	**Index**
	x̄	No.	
Bombus pascuorum	22.4	47	2.1
B. lapidarius	16.8	44	2.6
B. lucorum/B. terrestris	16.6	34	2.0
B. pratorum	13.8	21	1.5
B. hortorum	10.6	22	2.1
	Male life cycle		
	x̄		
Psithyrus vestalis	11.6	12	1.0
P. sylvestris	3.6	3	0.8
P. campestris	1.5	1	0.7

Book Review

Fishes of the Sea. The North Atlantic and Mediterranean. By John and Gillian Lythgoe. Blandford (Cassell), London. 1991. 256 pp., numerous coloured photographs and line-drawings. £25. ISBN 0-7137-2225-8.

The dust jacket of *Fishes of the Sea* claims it to be 'one of the most useful books on the identification of marine fish based on their appearance in life'. It claims to cover the inshore fishes of the Mediterranean and both the eastern and western Atlantic coasts, but does not include open-ocean species that rarely come into water less than 50 m deep.

The information is presented in systematic order grouped within classes by families. Each species has notes on range and a description of the animal's identifying features including coloration. Many of these species accounts contain a note of the length of the fish and most have some information on the natural history (i.e. habits, food and breeding) of the species.

The most laudable feature of the book is the wealth of colour photographs of fishes, mostly (but not all) taken by divers under water. These are both enjoyable to look at and informative in that they show living fishes in natural habitats, and above all natural colours. If one has any criticism of the colour pictures it is that too many of them are reproduced at too small a size to be as useful as they might have been. (A few *are* however, misidentified.) There are also numerous line drawings in conventional lateral view. They follow two styles, the first the slapdash, crude figures which have been used in an earlier edition of the book (1971), the others with more even and steady lines which give a better impression of the body shape of the fish.

To what extent is this a useful book for information and identification of North Atlantic fishes? Much of the information about European species has been simply reproduced from the 1971 edition (which was confined to this geographical area). To this has been added information about a selection of North American coastal fishes and line drawings of these species, but very few colour photographs represent western Atlantic species. In short, as a picture book for northern Atlantic species this has a strong European bias.

The text contains too many errors for the reader to have much faith in it. Curious spellings such as cartilagenous, oviperus and nictating (= nictitating) all occur several times on pages 12-16. There are said to be several species of basking shark in temperate seas (p.17) although Compagno's authoritative *Sharks of the World* says there is only one. *Symphodus bailloni* is said to be a western Atlantic species (p.139), *Atherina hepsetus* is entered twice in the account of the sand smelts (p.209), once with 'more than 58 scales' in the lateral series, and secondly 'with 52-57 scales'. (How is the layman to know that the second species really refers to *A. presbyter*?) The authors show a fine disregard for the use of parentheses around authorities for species names, e.g. *Anguilla anguilla* L. (p.60) and *Muraena helena* (L.) (p.61) are both wrong; in the first L. should be in brackets, in the second no brackets are needed. This is a taxonomist's niggle, of course, but it is symptomatic of the carelessness with which this book has been prepared. Of itself it does not matter much, but if the authors cannot get this correct (and there is no lack of authoritative sources to refer to) how much faith can the reader have in the rest of the text? The above points are not exhaustive, but are merely representative of the errors noted.

ALWYNE WHEELER

Recent Spider Records for the London Area

By J. Edward Milner*

I. RECORDS TO THE END OF 1991

Introduction

The editor has pointed out to me that my previous accounts of recent London spider records may have been a little misleading, in that by their titles (such as 'Spider records for the London Area for 1990-1991', *LN* **70**) they have suggested that the period reported was up to the end of a year, in this case 1991. However this has not been so and the report referred to above only included records up to early July 1991, and not to the end of the year. The present report completes the records up to and including the end of 1991; next year I hope to report on all the records for 1992, adding any further records for earlier years as they are confirmed. There is inevitably some backlog involved.

The period now referred to (July to December 1991) produced a total of four new records for Middlesex (marked *), but no new records for London County – the old LCC area.

CLUBIONIDAE

Two females of the fairly large 'mouse-spider' *Clubiona stagnatilis* were taken in reeds along the River Colne. This is not an uncommon spider in such places or in undisturbed long grass, but this is only the second recorded site in Middlesex for it.

THOMISIDAE

Two males of the Nationally Notable B crab-spider *Philodromus praedatus** were taken in a sweep-net in damp meadows at Fray's Fields, Middlesex. This area is one of the few extensive lowland water-meadows in the London Area and these specimens were taken during a short ecological survey of the area for English Nature.

AGELENIDAE

Two new localities in Middlesex for *Cicurina cicur* have been found; an adult male was taken in a pitfall trap set at the base of a large oak tree in Queen's Wood in December 1990, and in November 1991 adults of both sexes were taken in pitfalls at Hornsey Railway Land, in unimproved and undisturbed grassland with brambles.

THERIDIIDAE

Two new theridiids, previously not recorded for Middlesex, were taken at Fray's Fields in mid-July. Single male specimens of both *Theridion impressum** and *T. instabile** were swept from the meadow vegetation.

ARANEIDAE

A single rather small female *Araneus quadratus* was swept from thistles and other tall herbs in the small unmown part of the meadow above Kenwood Ladies Pond on Hampstead Heath in September 1991. This is only the second recorded site in London for this large and rather fine orb-web spinner; the other was wasteland adjacent to Gillespie Park in Islington.

LINYPHIIDAE

A single female of *Agyneta decora** was taken in August in a pitfall trap in

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'The Glade', a small grassy area at one corner of Coldfall Wood in Muswell Hill and perhaps the only grassland remnant of the former Finchley Common.

II. TWO RARE SPIDERS RECORDED ON HAMPSTEAD HEATH

In the course of pitfall-trapping on Hampstead Heath (as part of a spider survey on behalf of the Corporation of London who manage the Heath) three male specimens of a tiny pale linyphiid *Tapinocyboides pygmaeus* were taken in April–May 1992. The traps were standard pitfalls of a type described by the writer in *LN* **67**, and had functioned from 7 April to 9 May. The area where the spiders were trapped is on South Heath, near The Pryors, in dry, unimproved grassland, mainly *Festuca* sp. but with some patches of *Juncus* sp. on sandy or gravelly soil. In spite of the presence of *Juncus*, the site is probably one of the driest parts of Hampstead Heath. *T. pygmaeus* is designated as a *Red Data Book* Category 3 species. It is the first spider of such rarity to be taken in London.

According to C. Smith, co-ordinator of the National Spider Survey, *T. pygmaeus* has been previously recorded from only six sites in the UK; near Brighton in 1951 and more recently in E. Lothian, two localities in Northumberland and two localities in Buckinghamshire.

At the same trapping site on Hampstead Heath another new London record was taken. Two males of another small rather pale linyphiid, the Nationally Notable Category B species *Lepthyphantes insignis* were trapped in October 1991 and in April 1992. Two further specimens, one of each sex, were trapped in December 1991 in pitfalls among *Glyceria maxima* on the site of old ponds also on South Heath. According to Merrett (1990) *L. insignis* is mainly found on dry, calcareous grassland and has been recorded infrequently from 13 southern English counties and Fife in Scotland.

The Corporation of London is being urged to take steps to conserve these species by protecting the South Heath site, and curtailing the present mowing regime.

Acknowledgement

I wish to thank Dr Peter Merrett for confirming the identification of most of these specimens.

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The Status and Distribution of the Mole in Epping Forest

By Alwyne Wheeler* and Andrew May

Abstract

A survey of moles (from the evidence of molehills) in Epping Forest was conducted during 1991. Their presence was confirmed at only five sites (plus another just outside the Forest boundary). This is fewer than three decades ago, and contrasts with a number of general statements made about the status of the species in Essex and the London Area. Moles have been found to be present on long-established grasslands; none was found in mature woodland. The factors governing their abundance and decrease in numbers are discussed.

Introduction

Although the mole *Talpa europaea* is rarely seen, its presence in an area can be recorded easily by the signs of its burrowing activity. It is an animal highly specialized for living below the surface with modified fore-limbs and broad, strong and heavily clawed front feet which allow it to burrow through subsurface soil, the loose soil from this burrowing being pushed up to the surface at intervals to form distinctive molehills. However, according to Godfrey and Crowcroft (1960) the throwing-up of soil to form molehills is affected by the abundance of prey, the type of soil and seasonal activity. Also long-established colonies may inhabit a tunnel system which is sufficient to provide adequate food without further extension (Mellanby 1971), although this author identifies this behaviour with old deciduous woodland on clay soils.

In such circumstances freshly-made molehills are infrequent. It follows from this that the presence of fresh molehills is a positive sign of the presence of the mole, but their absence does not necessarily signify the absence of moles. It is therefore difficult to attempt to quantify the population within the area unless trapping can be employed.

During 1991 an attempt was made to establish the number of areas in which moles were present within Epping Forest. This was achieved by walking the areas in which moles had been recorded in previous years and by searching habitats similar to those in which moles were present elsewhere in the Forest.

Previous Records of Status

The published records of moles in Epping Forest are sparse and too often too generalized to be of value. Thus, Laver (1898) writing of mammals in Essex generally could say only '... is common in all parts of the county, although in every district it is subjected to great persecution ...', but he gave no details for the Forest. Other books concerned either wholly or in part with the natural history of the area make no mention at all of moles. However, Corke (1979) reported that 'Amongst the Insectivora, hedgehogs, moles and common shrews are common as they were in Laver's (1898) time', and in a tabulation includes moles as 'present, breeding in the Forest'. Seear (1964) in notes on the mammals of Essex listed a number of places where moles had been reported recently, none in Epping Forest. Teagle (1965) in a report on the mammals of the London Area had no records of moles in the Forest, nor had Burton (1966), but both Gold (1974) and Cotton (1980) recorded the species in Epping Forest, Fairmead Bottom and High Beach, Leytonstone, Theydon Bois and Wanstead (the last four places could be on Forest land or outside its boundary – although for Leytonstone and Wanstead it was probably Forest.

In summary, it seems that from earlier published records moles have been

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very poorly reported in the area and Corke's (1979) comment 'present, breeding in the Forest' is borne out by the records.

Present Survey

1. Areas where moles are established

Epping Long Green (5438 2068)

Two molehills close to the beaten track and part of a tunnel crossing it. The surroundings were heavily overgrown with purple moor-grass *Molinia caerulea* and bramble *Rubus*, and no other signs could be detected. This may have been the work of a mole from adjacent farmland, although the nearest fields had been ploughed.

Woodyard Plain, Lower Forest (5472 2031)

A small number of molehills at the edge of this small plain (which is grass-covered and close-cropped by rabbits). The colony of moles is concentrated partly underneath a large hawthorn. Hawthorn and sycamore scrub is invading this grassland. The ground is wet in the area of the molehills.

Sheppard's Meadows, Ivy Chimneys (5458 2012)

A large number of molehills (total 105 on 1 July 1991) mostly near pathways trodden by walkers and in adjacent long grass. These meadows lie on a slope, some molehills were found on the slope but most were near the bottom where the slope began to level off; the ground here is soft–wet depending on the season.

Honey Lane Plain, Waltham Abbey (5413 1996)

A number (20-35) of molehills on rabbit-grazed grass and in the edges of the adjacent coarse grass. The ground is damp–wet and at the foot of the hill close to a small stream.

Fairmead and Whitehouse Plain (5408 1967 to 5402 1967)

This large area of unimproved neutral grassland contains the largest populations of moles in the Forest. A few molehills were found on the slope to the north of the small stream running across Fairmead, but most were found in the valley bottom in wet ground dominated by bent grass *Agrostis* and Yorkshire fog *Holcus lanatus*. A small number of molehills were found in tussock grass areas where the ground is seasonally wet.

Debden Green camp site (5437 1988)

This extensive grassland area is adjacent to the boundary of the Forest; the fields are mowed several times during the camping season and are subject to trampling and human disturbance. It lies at the foot of the eastern slope from the Forest ridge and can be wet in winter. Most of the molehills were found near hedges in short grass except for two on a slope in one field. Although this site lies outside the Forest, in the 1960s–1970s there was a much larger number of molehills on the fields and they extended into Forest land under pollarded hornbeam and beech although the tree cover was sparse. The population at this site appears to be much smaller than it was formerly.

2. Areas searched without result

Grassland at the northern end of Wintry Wood, Epping Plain, Bell Common, Kemp's Lawn, Theydon Bois Golf Course, Theydon Plain, Long Running, Sunshine Plain, Birch Wood, Fairmead Bottom, the Nursery and Conservators Pound (Loughton), Warren Hill, Sewardstone Bury, Yardley Hill, Yates's Meadow, Chingford Plain, Chingford Golf Course, Whitehall Plain. These areas are all grassland sites which appear to offer habitats similar to those in which molehills were found.

Two of them (Kemp's Lawn and Theydon Bois Golf Course) were known sites for molehills in the 1960s and 1970s. The golf course population lived on the lower slope of the western part of the course close to the stream. They were trapped by the golf course staff by means of scissors traps which appear to have succeeded in exterminating them some time in the late 1970s. Neither population ever appeared to be large.

No systematic search was made of ancient woodland, but secondary woodland and scrub in the vicinity of known mole habitats were searched without result. It is considered that if moles exist in the ancient woodland of Epping Forest they are not creating new tunnels and thus molehills, because none has been seen in the course of other woodland work or walking either recently (or in the course of about 40 years of familiarity with the Forest by A.W.). It is our belief that they do not live in woodland in Epping Forest.

Discussion

The results of this survey have shown that moles are by no means common in Epping Forest and colonies have been found only at five sites. Of these, the Epping Long Green is not a significant site, only two molehills were found and it may be an ephermeral 'colony' created by a single mole from an undiscovered group in nearby fields. The Woodyard Plain site contains few molehills and it might be expected that the population is small; this site is a small grassland area isolated by woodland on all sides and a major road on one side. Honey Lane Plain contains a larger population and there is extensive grassland surrounding it; it is the third most important site for moles in the Forest.

The most important sites are undoubtedly Sheppard's Meadows and the Fairmead–Whitehouse Plain complex, both of which appear to contain large populations. Both are long-established grassland sites, which have been mowed but not otherwise cultivated. Sheppard's Meadows is a relatively recent addition to the Forest (1991) which has been maintained as pasture for a long time.

As noted above, three former sites in which moles occurred in the Forest (Kemp's Lawn, Theydon Bois Golf Course and Debden Green camp site) no longer contain moles. The loss of the population at the second of these was due probably to trapping and persecution by golf course employees in the past. Debden Green was a marginal site with a large population in the fields adjacent to the Forest and a few molehills in secondary woodland, possibly an extension of the population as young moles dispersed. The whole site now contains fewer moles with none on Forest land. Possibly regular mowing of the campsite and the seasonal influx of visiting campers have contributed to the decline. Kemp's Lawn only ever contained a small group of molehills in the 1960s and the site is now mostly degenerated from grassland into scrub.

The three major mole populations lie in old grassland sites. In each case they are at the foot of a slope and are in damp to wet ground seasonally; two are close to streams at the bottom of the slope. Two of the former sites are also in similar situations in wet ground at the foot of a slope close to a stream. In Epping Forest a typical 'mole site' is at or near the foot of a slope in short to moderately long grass, but not in tussocks of tufted hair-grass *Deschampsia cespitosa* or purple moor-grass. They are often most visible beside or on the paths made by walkers but are not confined to the short grass.

According to Mellanby (1971) the food of the mole is primarily earthworms, in particular *Lumbricus terrestris*. In an attempt to establish the abundance of earthworms in grasslands inhabited by moles and for comparison with woodland habitats we collected earthworms from several sites by treating 0.25 m^2 areas with dilute formalin solution as recommended by Sims and Gerard (1985). At low concentrations formalin acts as an irritant and the worms come to the surface, are captured, washed in clean water, and are then identified, weighed and later released.

Six habitat types were treated in this way, two of them different areas of grass at Fairmead and four different kinds of woodland. Details are given in Table 1.

TABLE 1. Comparison of numbers of earthworms *Lumbricus terrestris* from different habitat types. Grassland – Fairmead; Hornbeam 1 – beneath old pollarded tree near Earl's Path; Beech – beneath pollard in flood plain of Loughton Brook; Secondary woodland – beneath young oak close to hawthorn–bramble scrub near Honey Lane Plain; Hornbeam 2 – beneath hornbeam pollard at edge of ancient woodland, soil damp with good cover of liverworts and nettles.

Habitat	**pH of soil**	**No. of worms**	**Total weight(g)**	**Estimated weight/m^2**
GRASSLAND				
Phleum pratense	x̄ 6.00	13	18.95	75.8
Deschampsia cespitosa	x̄ 6.28	5	2.55	10.2
FOREST				
Hornbeam 1	x̄ 5.64	0	0	—
Beech	x̄ 6.20	0	0	—
Secondary woodland	no data	0	0	—
Hornbeam 2	no data	9	5.00	20

These observations on the biomass of worms at differing habitats possibly offer some explanations for the distribution and abundance of moles. The timothy grass *Phleum pratense* area on Fairmead yielded the greatest number and weight of worms (13 and 18.95g).

This site was close to the largest mole colony observed; probably these facts are connected. The sample from tufted hair-grass also had a considerable number of worms (5) but a rather lower weight (2.55g). This area had a mole population adjacent but relatively few molehills were observed. Tufted hair-grass-dominated areas are widespread in the Forest but few molehills have been located in them. Samples taken in woodland were mostly notable for the absence of worms; only the Hornbeam 2 sample produced any number of worms (9) and a weight of 5.00 g. This sample was exceptional in that it was taken from a damp gully of dark soil, which was much wetter than the samples from dry soil overlain by leaf-litter at the other two areas. Nevertheless these weights are poor when compared with the 220 g/m^2 reported by Mellanby for Monks Wood N.N.R.

All the Epping Forest sites are acidic and possibly this has a bearing on the biomass of worms. But it is surprising that from our small number of samples worms appear to be absent from the woodland floor. This, however, might explain the apparent absence of moles in woodland sites.

Taken overall, the mole seems to be a relatively scarce and localized animal in Epping Forest. It seems to be more restricted in occurrence than it was two to three decades ago. Two former sites are no longer inhabited and the population of a third is much reduced. Possible causes for this reduction are the growth of scrub and coarse vegetation at the Kemp's Lawn site. The Debden Green site's diminution may be due to regular mowing throughout the camping season, and greater human presence than formerly. In only the Theydon Bois Golf Course site can a probable cause for disappearance be postulated when the staff set scissors traps over several seasons (A.W. pers. obs.).

It might be noted here that the mole population in Theydon Bois in pastures outside the Forest has diminished due to other causes; on one farm when the turf was sold off from old pasture and the field ploughed and reseeded with grass; on two others where old pastures were ploughed and sown with grain. Each episode seems to have resulted in the mole colony disappearing. Other authors writing of moles in the London Area, e.g. Teagle (1965) and Burton (1966), have made the point that the mole is particularly threatened by the management of sports grounds including golf courses. This is borne out in Epping Forest and it may be significant that the largest areas of grassland are golf courses and mole free. With the current fashion for turning fields taken out of agricultural use into golf courses the future of the mole seems bleak.

Acknowledgements

We thank Rebekah Dormor and Sarah Perryman for their help with the field work, and Carol Boyce-Mears for typing the manuscript. We also thank P. A. Morris of Royal Holloway and Bedford New College for advice on mole habitats in woodlands. Our thanks are due to Paul Moxey, Warden and Director of Studies at Epping Forest Conservation Centre for the use of facilities and space in the Centre.

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Book Review

Encyclopedia of Marine Animals. By Neville Coleman. Blandford (Cassell), London. 1991. 324 pp, A4+, numerous coloured photographs. £25. ISBN 0-7137-2289-4.

Neville Coleman is an Australian diver and underwater photographer who has a major reputation as a marine naturalist, popularizer of underwater life and of conservation.

This encyclopaedia is very extensive although mostly concerned with the marine animals of the Indo-West Pacific. This area includes the most extensive reef formations in the world and being tropical has the most varied and colourful fauna. This richness has resulted in one of the most spectacularly colourful books of marine animals I have seen. Its basic arrangement is systematic, starting with sponges, jellyfishes and hydroids, running through the invertebrates such as flatworms, sea-mosses, crustaceans, molluscs and star-fishes, and ending with the vertebrate marine groups of fishes, reptiles and mammals.

Within each of these groups each species has fundamental information of family and scientific names, common name, distribution, habitat, food, size and a description. The heading description is a misnomer because much of the information given is of life-style and habits. Each species is illustrated with a colour photograph. As the pages are laid out in three columns, most of the colour pictures are relatively small, occupying the width of one column, but some are larger. The introductory pages to each major group and occasional pages through the text have the most spectacular double-spreads or whole-page photographs.

The colour reproduction is excellent and the book is well designed and laid out. Neville Coleman has obviously taken great trouble to work with numerous (mostly Australian) specialists – at least he acknowledges their help, and the text is authoritative. Whether you regard this as an encylopaedia and use it for reference (but its relevance at species level is mainly Australian) or treat it as a super picture-book of marine life with informative text you will find it unexcelled.

Alwyne Wheeler

Book Review

A Dictionary of Scientific Bird Names. By James A. Jobling. Oxford University Press. 1991. 272 pp. £19.95. ISBN 0-19-854634-3.

There has long been a need for an authoritative book explaining the scientific names of the world's birds. On several occasions over the years I have started to prepare one myself, but a combination of events, and perhaps idleness, has prevented me proceeding far with this enterprise. It does, however, mean that I can appreciate the hard, at times boring, work and erudition that James Jobling has put into this.

I must however admit that my first reaction to the book was one of disappointment. This is perhaps unfair for when I received the book I was only slowly recuperating from an operation in hospital. But I kept asking myself the question why? It was particularly relevant with names under the general heading of eponyms, or, in plain English, names commemorating a real, mythical, or fictitious character. It is all very well to say under *abbas*, for example, 'an abbot; after J. Abbott (1751-1840) US philologist'. But why? This was the same kind of complaint I had about Wynne (1969), to whom Jobling refers, but Wynne at least gives references for further investigation.

But later, as my health improved, I came to realise how unfair I had been. To give all the information for which I was seeking the requirement would be a book of many hundreds of pages, produced at an exorbitant cost. I would naturally like to see such a book and one that dealt with each species (and maybe subspecies) separately and explained the names, some of which, because of generic changes or subsequent discoveries, are quite nonsensical. But this would, I believe, be an impossibility although it could perhaps be produced in separate publications, each covering a single family or maybe a group of families.

Despite these quibbles I consider the book to be invaluable. In particular I found the introductory paragraphs concise and clear and I believe the sections on nomenclature, etc. to be amongst the best I have ever read. They made the subject easy to understand for any birdwatcher coming new to the subject.

I have spent many hours perusing the *Dictionary* itself and found only one very minor entry which I could query – that is under *adamsi*. My belief is that Edward Adams, the discoverer of the white-billed diver, left the Arctic in 1855 and not 1856. But as I say this is nit-picking. To sum up, I believe the final paragraph of the dust-jacket blurb expresses my own opinion. It reads 'This book will find a permanent place on every ornithologist's shelf and will be a valuable reference source for everyone whose work or interest brings them into contact with birds.'

The author is a former active member of the LNHS and sometime editor of our *Ornithological Bulletin*.

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Malcolm Wilsdon

Survey of Bookham Common

FIFTIETH YEAR

Progress Report for 1991

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General (C. B. Ashby*)

We mark the fiftieth year of the Survey with a further bibliography, on pages 169-176 of this issue, of the papers and reviews published in *The London Naturalist* from 1968 to date, being a continuation of the bibliography of the first 25 years given in *L.N.* **47.** In addition, parts 2(a) and 2(b) of the new bibliography list references to the geology, conservation and natural history of Bookham Common contained in external publications.

The Presidential Address given at the Annual General Meeting in 1967 included a review of the first 25 years (Beven, *L.N.* **47:** 95-99) and a similar service for the second quarter century was provided at the Annual General Meeting in December 1990 (Ashby, *L.N.* **70:** 9-28). Until such time as it is possible to bring together between two covers the results of all these studies, a project worthy of serious consideration, it is hoped that ready access to the very considerable volume of published information will be provided by the bibliographies and the reviews of 1967 and 1990.

In the Progress Report for the second year of the Survey, 1943, C. P. Castell and R. M. Payne recognised at the outset that 'the stage of lists and group surveys is, of course, a necessary preliminary, but ecological work must consider not only the relations between the different species of any one taxonomic group of animals and plants, but the inter-relations of members of different groups' (*L.N.* **23:** 22-29). How well the Survey has conformed to these principles over its long life we must leave others to judge.

What of the present and the future? From the pages which follow it will be evident that the Survey has lost none of its momentum, but continues in directions determined by the varied interests and abilities of its members. An annual breeding-season census of the birds of Eastern Wood has been conducted almost without a break since 1946 (Beven, *L.N.* **30:** 57-72) and still continues. Ron Kettle's report of the 1991 census is given on pages 166-7 and the fluctuations in the numbers of breeding birds which it reveals are discussed. Our small summer population of herons, which first successfully bred in Eastern Wood in 1988 after false starts in two previous years, has transferred to Stent's Wood and Central Wood. Five of eight nests in 1991 held young in April.

The vegetation of the Common is continuously monitored and *Stachys* × *ambigua*, a hybrid having the marsh and hedge woundworts as its parents, first

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noted in 1953, has now been located by Ken Page in five of the 20 botanical divisions. Its colonisation of new areas is enigmatic as fruit is formed but usually does not develop. A total of 18 naturally occurring plant hybrids has now been recorded for the Common (Page, *L.N.* **70:** 126). Other botanical studies currently in progress are of a nature requiring several years of investigation before the results may be presented. Although some 500 species of fungi have already been noted from woodland and other habitats, Pamela Goldsmith has been able to add a further 15 species to the list in 1991.

Entomological studies by Ian Menzies are given on pages 161-162. Roesel's bush-cricket has of late been found in several parts of Surrey, and in September the first for Bookham was seen on Western Plain. Other firsts were the buprestid beetle *Trachys scrobiculatus* and the beetle *Metoecus paradoxus*, which in appearance is far from the usual concept of a beetle, and is the only representative in Britain of a small family, the Rhipiphoridae, living parasitically with wasps and other insects. The *Red Data Book* beetles *Agrilus pannonicus* and *Zeugophora flavicollis* were again recorded in 1991; indeed, Bookham Common is one of the very few known sites of *flavicollis*. Ruth Day has continued her long-term population studies, begun in 1985, of the damselflies and dragonflies and her report is on pages 162-166.

The physical and vegetational changes brought about by essential management, and by the re-introduction in 1989 of grazing by farm animals, present almost unlimited scope for enquiry. The Survey Team lays no claim to exclusive rights. General naturalists and specialists alike are invited to share these opportunities in a spirit of friendly co-operation and endeavour.

Management Work on the Bookham Commons (Ian F. Swinney,* National Trust Warden)

The overall management of the Commons is fairly broad in its outlook, so that whilst the requirements of individual plants and animal species are recognised, the separate habitats of this dynamic ecosystem undergoing seral change have to be managed to keep them varied and interesting. Rotational cutting of the woodland edges provides new areas for plants and animals to colonise, and prevents the whole property becoming dense oak woodland.

The wildlife value of the woodland areas can be greatly enhanced by 'scalloping' edges and creating glades, trying to imitate more natural woodland. With this in mind two existing glades along Glade Path have been enlarged to provide sunny areas for the woodland butterflies and bare ground for willows to colonise; so that in 20 or more years there will be good trees for the purple emperor *Apatura iris*. Goat willow *Salix caprea* and sallow *Salix cinerea* are both used by this butterfly for egg laying, with a preference for single-stemmed female *caprea* having a broad crown to provide shade from the afternoon sun for eggs and larvae. Developing vegetation in these areas will lead in turn to a greater diversity of invertebrates, birds and other animals.

With many wetland areas under threat from drainage, water abstraction and the recent dry summers (and perhaps, even more importantly, dry winters) the ponds, streams and marshy areas of the Bookham Commons are very precious. Such habitats are undergoing seral change too, the willow carr developing in them drying enough to support oak woodland. At the south-eastern edge of the Isle of Wight enclosure, where Central Ditch fans out delta-like before becoming part of Bookham Stream, the oaks and willows have been cleared back to let in more light and encourage the spread of the aquatic plants.

Further clearance has taken place in the grazed area of Central Plain, increasing the grassland whilst retaining valuable clumps of scrub. Mature associations of blackthorn *Prunus spinosa*, hawthorn *Crataegus monogyna* and

*Merritt's Cottage, Great Bookham Common, Leatherhead, Surrey KT23 3HZ.

dog rose *Rosa canina* provide valuable habitats for invertebrates, and nest sites, shelter and food sources for the birds. Population size is important and retained areas of species-rich unimproved grassland must be of significant size, enabling populations of each plant and animal species to withstand environmental change as, for example, a dry summer or exceptionally cold winter.

The specialist knowledge of the members of the London Natural History Society has been of immense value in the management of the Commons. When considering work in many of the important areas of the property, consultation with members of the Survey helps us to maintain and enhance the variety of wildlife. The 50 years' Survey of the Commons has made Bookham one of the best-recorded sites in the country. Please support the Survey so that this valuable work may continue.

Vegetation (Ken Page*)

Stachys × *ambigua* (hybrid woundwort)

Stachys palustris, marsh woundwort, and *S. sylvatica*, hedge woundwort, the two species involved in the hybrid, are both plentiful on the Common. The former, as the common name implies, is restricted to damper places; the latter is less specific regarding habitat requirements and occurs in most areas.

The hybrid has been found in five of the 20 botanical divisions, though it is not clear whether the plants are the result of sexual reproduction or have been vegetatively spread by rhizome segments. It is possible that both forms of renewal are involved.

All the hybrid plants show a greater resemblance to *S. palustris* in leaf shape and flower colour, but have the somewhat foetid smell of *S. sylvatica*. Leaves are oblong to broadly lanceolate with a slightly cordate base and are distinctly petiolate. Flower colour is a pale purplish-red. *S. ambigua* is highly sterile: fruit is formed but does not develop.

The hybrid was first recorded on the Common by A. W. Jones in 1953. It was found in the edge of a wood in Division O. A hybrid plant is still in this division. On Commonside (Division M) a plant growing in a ditch forming the boundary between the Common and a garden is frequently cut down by the residents of the property. This stimulates rhizome growth, increasing the area of the plant substantially each year. In a rich, moist soil on the edge of Upper Eastern Pond in Division N, an extremely vigorous specimen can be seen. Single plants also occur in Divisions Q and P.

Because of its similarity to *S. palustris* in foliage and flower the hybrid plant is often difficult to spot. There may be others to be discovered on the Common.

Fungi (Pamela Goldsmith**)

In most years, we record fungi whose names have not been published before in our journals. This does not mean that they are new arrivals to the Common, simply that they have not been noticed before, as quite often they are very common species. Several such are included in the following list of 'new' records for 1991.

Agaricales

Agaricus xanthodermus	South-East Wood and Plain, 29 September.
Boletus piperatus	–do–
Coprinus leiocephalus	Central and Eastern Plain, 3 November.
Cortinarius sanguineus	–do–
Cortinarius trivialis	–do–
Entoloma nidorosum	–do–

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**14 Mayfield Road, London SW19 3NF.

Hebeloma anthracophilum	–do–
Laccaria proxima	–do–
Lepiota castanea	–do–
Mycena arcangeliana (= *M. oortiana*)	–do–
Aphyllophorales	
Clavariadelphus fistulosus	–do–
Gasteromycetes	
Lycoperdon foetidum	–do–
Ascomycetes	
Erysiphe sordida on *Plantago major*	–do–
Hypoxylon multiforme	
Fungus imperfectus	
Spinellus fusiger on *Collybia dryophila*	–do–

I am grateful to Mrs Audrey Thomas and Mr Brian Spooner for help in identifying some of the foregoing specimens.

Tardigrades (C. B. Ashby)

'Bear animalcules, or water bears, are among the commonest of animals yet few people ever see them.' Thus wrote Professor J. Arthur Thompson in 1934 in his classic two-volume work *Biology for Everyman*. It has to be admitted that in the long life of the Survey no determined effort to find them seems to have been made. Armand Le Gros, an active and valued member of the Bookham team from at least 1951 to 1976, was the author of four papers on tardigrades in external publications (Le Gros 1956, 1957, 1958, 1959) but he published nothing from Bookham.

Known for perhaps 200 years, the tardigrades now number more than 500 species world-wide in a variety of terrestrial, aquatic and marine habitats. Potential habitats at Bookham include the soil, leaf-litter, mosses, lichens, tree-holes, the ponds and streams. 'The evidence of comparative anatomy suggests that tardigrades are most closely related to the arthropods ...' (Kinchin 1992), but essentially they are primitive life-forms sufficiently distinct to be accorded their own phylum.

Against this background it is of interest to record that two individuals of a tardigrade provisionally identified as *Dactylobiotus (Macrobiotus) dispar* were found by me in a drop of water from East Hollow Pond on 28 March 1991. The closely related species *D. dispar, D. ambiguus* and *D. macronyx* are said to be separable only by examination of their eggs. P. M. Greaves (1991) lists 14 species for the county and comments that only two previous reports of tardigrades in Surrey in particular have been published.

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Orthoptera (Ian S. Menzies*)

Roesel's bush-cricket *Metrioptera roeselii* (Hagenbach): a single male was detected and closely examined as it stridulated in a grass clump beside a blackberry bush on the Western Plain, 1.ix.1991. This species appears to be new to the Common. On the same afternoon two male *Conocephalus discolor* (Thunberg) were observed in the area of Western Plain where the species was first noted in 1990. In recent years both these species have become established in several areas of Surrey.

Hemiptera–Heteroptera (Ian S. Menzies)

The 'box bug', *Gonocerus acuteangulatus* (Goeze), first beaten from a holly in Hill House Wood on 14 January 1990, has continued to turn up during 1991. On 6.iv.1991 two were again found by beating holly in Hill House Wood, but on most occasions they have been associated with hawthorn. The bishop's mitre, *Aelia acuminata* (L.), six examples of which were seen on 17.vii.1991 while sweeping a grassy area of Bayfield Plain, seems to be increasing its hold.

Coleoptera (Ian S. Menzies)

RD = Red data book classification by the Nature Conservancy Council.

BUPRESTIDAE

Several examples of *Trachys scrobiculatus* Kiesenwetter, not previously known from Bookham, were swept from the patches of *Glechoma* on both the Central and adjacent parts of Bayfield Plain on 11 & 12.v.1991.

Agrilus pannonicus (Piller & Mitterpacher), an RD2-classified beetle first recorded on the Common in 1990, honoured the Survey Team by flying in to tea at the LNHS hut at 5.15 p.m. on Sunday 7.vii.1991!

CERAMBYCIDAE

The local longicorn *Pogonocherus hispidus* (L.) was found by beating holly under the oaks of Hill House Wood on 30.iii & 6.iv.1991.

CHRYSOMELIDAE

Beating the lower branches of holly growing under oaks in Hill House Wood on 30.iii & 6.iv.1991 yielded a surprising number of flea-beetles (Halticinae). The familiar *Aphthona euphorbiae* (Schrank) was present in hundreds. *Longitarsus parvulus* (Paykull), a scarce species, was present in smaller numbers (about 1 *L. parvulus* to 20 *A. euphorbiae*), but distinction of the species requires close examination. Like many other arthropods, they seek shelter during the winter and early spring amongst the leaves of evergreens such as holly, yew and ivy, but their true foodplants are not yet known with certainty. A single *Longitarsus lycopi* (Foudras) was also beaten from holly on 6.iv.1991.

Later, on 11 & 12.v.1991, *Longitarsus lycopi* was again found, in large numbers, by sweeping the patches of flowering ground ivy *Glechoma hedracea* growing in the areas of Central Plain recently cleared of scrub. *Glechoma* is evidently one of several labiate foodplants for this species, which is normally very scarce.

Other notable beetles during 1991 were *Chalcoides nitidula* (L.) of which several were found on aspens on Bayfield Plain (22.ix.1991), and the very rare *Zeugophora flavicollis* (Marsham) of which one was seen on 22.ix and a further three on 13.x.1991, in company with the more familiar *Z. subspinosa* (Fabricius), also on Bayfield Plain. It is good news that *Z. flavicollis*, classified as an *RD1* beetle and recorded in the British Isles during recent years almost exclusively from Bookham Common, is doing well. The other recent British records are from Leicestershire.

The phytophagous beetles *Phyllobrotica quadrimaculata* (L.) and *Chrysolina staphylaea* (L.), both only recorded once previously from Bookham, have been seen again this year. Several of the former were found devouring the leaves of skullcap *Scutellaria galericulata* on 7.vii.1991, and a single example of the latter was swept from vegetation on 11.v.1991, on both occasions by the side of the Lower Eastern Pond.

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ATTELABIDAE

A single example of the beautiful green weevil *Byctiscus populi* (L.) was seen on a leaf of sapling aspen, Eastern Plain, 9.v.1991. This rare species has varied considerably in numbers from year to year since its discovery on the Eastern Plain in the early 1950s, and was not seen at all during 1990. Bookham Common has the distinction of having both British species of *Byctiscus, populi* (L.) and *betulae* (L.), associated with the aspens on Eastern Plain.

RHIPIPHORIDAE

A single male of the extraordinary beetle *Metoecus paradoxus* (L.) was beaten from aspen on Bayfield Plain, 22.ix.1991. This species, which is a wasp parasite, is new to Bookham.

Odonata (Ruth Day*)

The azure damselfly *Coenagrion puella* appears to have been replaced in 1991 by the emerald damselfly *Lestes sponsa* as the dominant species at both Lower Eastern Pond and South-East Pond. The bar charts in Figures 1 and 2 illustrate this and Table 1 gives the figures. Why and how did this change happen? Will it persist?

Moore (1964) found that in optimal weather conditions there was a 'Highest Steady Density' of male damselflies perched on the vegetation around a pond. The simplest way of taking a census, therefore was to walk round the pond on

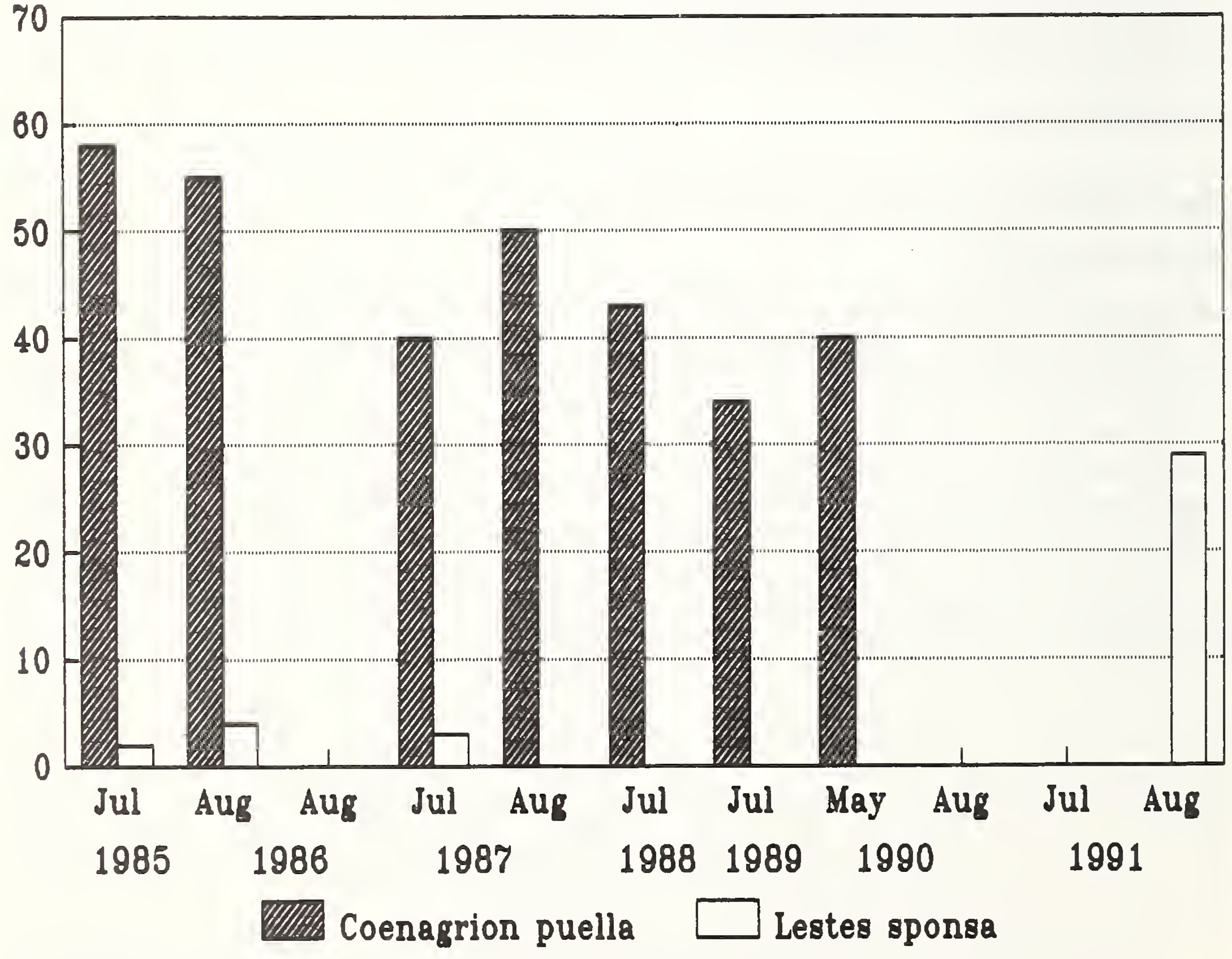

FIG. 1. How *Lestes sponsa* has taken over from *Coenagrion puella* as the dominant damselfly species at South-East Pond 1985-91.

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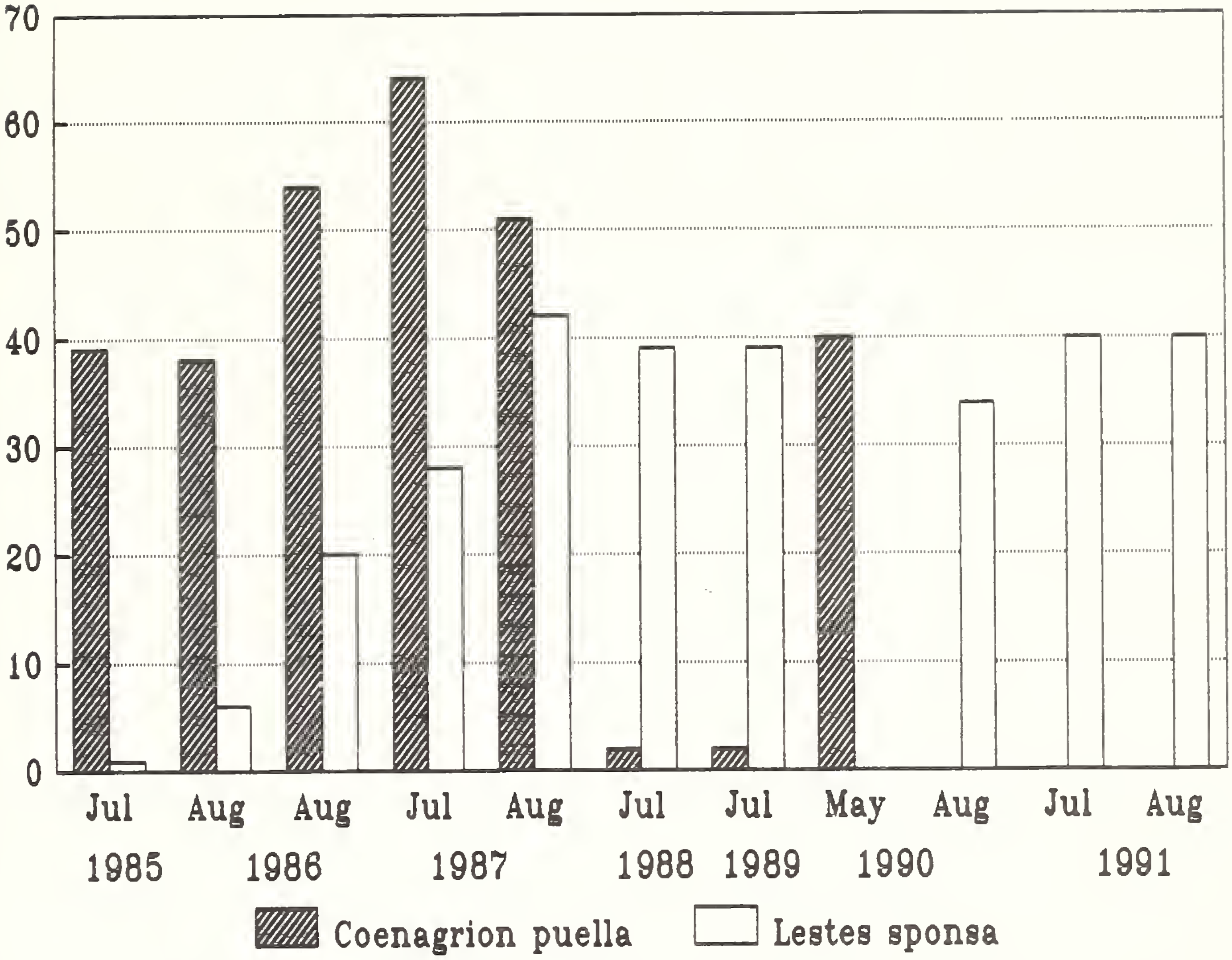

FIG. 2. How *Lestes sponsa* has taken over from *Coenagrion puella* as the dominant damselfly species at Lower Eastern Pond 1985-91.

TABLE 1. How *Lestes sponsa* has taken over from *Coenagrion puella* as the dominant damselfly (Zygoptera) species at South-East and Lower Eastern Ponds 1985-91. Figures show the maximum number of males caught in one day.

	1985		1986	1987		1988	1989	1990		1991			
	Jul.	Aug.	Aug.	Jul.	Aug.	Jul.	Jul.	May	Aug.	May	Jun.	Jul.	Aug.
South-East Pond													
C. puella	58	55	0	40	50	43	34	40	0	0	0	0	0
L. sponsa	2	4	0	3	0	0	0	0	0	0	0	29	40
Lower Eastern Pond													
C. puella	39	38	54	64	51	2	2	40	0	0	0	0	0
L. sponsa	1	6	20	28	42	39	39	0	34	0	1	40	40

a bright, sunny, warm day and count the number of males per metre of pond edge. This method worked very well for the ponds Moore studied on the Arne Peninsula, but could not easily be applied at Lower Eastern Pond and South-East Pond at Bookham Common. Both these ponds are surrounded by trees which may shade large areas of reed and the reedmace *Typha latifolia* at Lower Eastern Pond is so tall and covers such a large area, that one cannot see any damselflies which are more than a couple of yards away. Moore's method also depends very much upon the weather, and I started my work at Bookham during the very wet summer of 1985. Each year, therefore, I have been using a mark/recapture method of census, aiming to mark every damselfly I can catch on each day, until I have marked at least 40 males of the most abundant species. Tables 2 and 3 show the results in 1991. On days when I have succeeded in marking 40 or more, this has taken one to two hours per pond, depending on

TABLE 2. Number of male damselflies caught each day in summer 1991. No females were caught.

Date	Air Temp °C	Light 1,000 lux	Time BST	Damselflies caught *C. puella*	Damselflies caught *L. sponsa*
		South-East Pond			
31 Jul.	22	108	15.05	0	29
1 Aug.	23	6	11.17	0	40
2 Aug.	22	108	11.20	0	40
3 Aug.	22	6	10.40	0	40
		Lower Eastern Pond			
31 Jul.	22	108	13.30	0	40
1 Aug.	23	6	12.27	0	40
2 Aug.	22	108	12.45	0	41
3 Aug.	22	6	11.40	1	40

TABLE 3. Population estimates of male *Lestes sponsa* in summer 1991 using Jolly's stochastic method.

1 Aug.	South-East Pond	308
	Lower Eastern Pond	239
2 Aug.	South-East Pond	189
	Lower Eastern Pond	307

the weather. On the days when I only marked a smaller number, the weather was overcast, cold or wet and the damselflies were not there to be caught.

Nevertheless, my population estimates for the years 1985-91, calculated by Jolly's stochastic method (Begon 1979) show a reasonable consistency: the mean populations being between 200 and 250 for the two species concerned. The figures are as follows:

1985-91	*Coenagrion puella* at Lower Eastern Pond:	mean 200 (n=17)
1985-91	*Coenagrion puella* South-East Pond:	mean 250 (n=16)
1986-91	*Lestes sponsa* at Lower Eastern Pond:	mean 241 (n=14)
1991	*Lestes sponsa* at South-East Pond:	mean 249 (n= 2)

My first thought was that following Moore's observations, there must be between 30 and 60 'good' perches at each pond, and that this was the limiting factor. In 1986 and 1987, however, both species were present at the same time at Lower Eastern Pond, so on these occasions between 70 and 90 perches were seen to be occupied. In 1988 and 1989 *L. sponsa* was dominant in July at Lower Eastern Pond, but most of the *C. puella* males may have emerged earlier in the year, as I know happened in 1990, when 40 males were captured in May at both ponds, and the flight period was over in July, when *L. sponsa* was on the wing. I finally concluded therefore, that the change in dominant species was not due to interspecific competition, but to a change in the nature of the habitat – the most obvious one being the lack of permanent water. Both ponds dried out in the late summer of 1990 and South-East Pond stayed dry throughout the winter, indeed, the bottom grew a flourishing crop of flote-grass *Glyceria fluitans*.

Coenagrion puella overwinters as a larva, and could not survive a dry pond, whereas *Lestes sponsa* spends the winter as an egg in diapause and emerges as a larva in the early spring. *L. sponsa* has always been present at both ponds, and it is easy to see how this species has been able to do well at Lower Eastern pond, which filled up again during the winter – albeit to a lower water level. At South-East Pond, however, there was very little water, even by 23 May 1991, so where did that lively July and August population come from? The obvious answer is Lower Eastern Pond, but both my own work in 1985 and that of Banks and Thompson in the same year showed that *C. puella* males hardly ever leave their natal pond and travel a few metres to another one. *L. sponsa*, may be different, but it seems unlikely that 308 of them migrated 300 metres in July 1982.

Bratton and Langlois (1984) noted nine species of Anisoptera which occur on the Common. Of these, *Aeshna cyanea, Libellula depressa* and *Sympetrum sanguineum* have since been seen in some numbers. *S. sanguineum*, indeed, has increased during the last two years (Table 4). I have not seen either *Sympetrum danae* or *Libellula quadrimaculata* at Bookham, but the other four species, *Aeshna grandis, Aeshna mixta, Anax imperator* and *Sympetrum striolatum*, occur in small numbers quite regularly. The Zygoptera, being far less mobile, are easier to survey, and all six species mentioned by Bratton and Langlois (1984) occur quite regularly, though only *C. puella* and *L. sponsa* are at all abundant. Table 5 shows the other observations made during 1991.

TABLE 4. Male *Sympetrum sanguineum* seen at both ponds in summer 1991. Individuals are identified by numbers. Different coloured pens were used for different ponds.

Date	Numbers	Total
	South-East Pond	
31 Jul.	1 2 3	3
1 Aug.	4 5 6 7 8	5
2 Aug.	9 10	2
3 Aug.	None	
	Lower Eastern Pond	
31 Jul.	1 2 3 4 5 6 7 8	8
1 Aug.	9 10 11 12 13	5
2 Aug.	6 14 15 17 18 19 20 21 22 23 24	11
3 Aug.	1 25 26	2

TABLE 5. Other observations in summer 1991.

Date	Site	Air temp.	Light	Time BST	Sex & No. ♂	♀	Species	Observations	Observer
23 May	Sheepbell Pond	Warm	Overcast, brief sunshine	16.00	2	1	*P. nymphula*		R. Day
29 June	Lower Eastern Pond	22°C	Sunny, broken cloud	13.10	1	–	*C. splendens*		R. Day
					–	1	*L. sponsa*		R. Day
7 July	Kelsey's Pond	–	–	–	3	1	*L. depressa*		C. B. Ashby
	I. of Wight Pond	–	–	–	3	1	*C. splendens*	Territorial	C. B. Ashby
	W. Hollow	–	–	–	2	–	*C. splendens*		C. B. Ashby
20 Sept.	South-East Pond	–	Sunny	13.00	2	–	*L. sponsa*	Water low, Pond still grassy	R. Day
					1	–	*S. sanguineum*		R. Day
	Lower Eastern Pond			13.17	2	–	*L. depressa*		R. Day

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Birds (Ron Kettle*)

The Common Birds Census in Eastern Wood was continued in the 1991 breeding season with a total of nine visits made by Ron Kettle (8) and Andrew Merritt (1) from April to early July. This was fewer than the 12 visits made in 1990, as a result of A.M. dropping out after a single visit in April. Much credit is, however, due to Andrew for keeping the census going in the 1980s. The number of territories for each species was:

Sparrowhawk *Accipiter nisus*	1
Stock dove *Columba oenas*	1
Cuckoo *Cuculus canorus*	2
Green woodpecker *Picus viridis*	1
Great spotted woodpecker *Dendrocopos major*	2
Wren *Troglodytes troglodytes*	17
Dunnock *Prunella modularis*	1
Robin *Erithacus rubecula*	28
Blackbird *Turdus merula*	12
Song thrush *Turdus philomelos*	5
Mistle thrush *Turdus viscivorus*	1
Blackcap *Sylvia atricapilla*	3
Chiffchaff *Phylloscopus collybita*	3
Long-tailed tit *Aegithalos caudatus*	2
Marsh tit *Parus palustris*	1
Coal tit *Parus ater*	4
Blue tit *Parus caeruleus*	16
Great tit *Parus major*	11
Nuthatch *Sitta europaea*	1
Treecreeper *Certhia familiaris*	2
Jay *Garrulus glandarius*	3
Magpie *Pica pica*	1
Carrion crow *Corvus corone*	2
Chaffinch *Fringilla coelebs*	5

The total number of species is one more than in 1990. Stock dove, green woodpecker and mistle thrush were not credited with territories the previous year, while willow warbler *Phylloscopus trochilus* and bullfinch *Pyrrhula pyrrhula* were. These are all species normally present on the plot in low numbers and on the borderline of having a breeding territory or not. Woodpigeons *Columba palumbus* also nest and probably starlings *Sturnus vulgaris*.

The most notable changes were the dramatic drop in robin numbers from 40 to 28 and of wren from 25 to 17, no doubt due to the severe spell of weather in the late winter, and the halving of blue tit numbers from 31 to 16, although those of great tit dropped only slightly. Marsh tits were down from three pairs to one, but the presence of willow tits *Parus montanus* in April was welcome.

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Chiffchaff numbers were down from six to three, and the absence of a willow warbler territory compares to two in each of the two previous years.

The sparrowhawks' nest was not in Eastern Wood this year but just over the boundary in Mark Oak Wood, where A. W. A. Hazeldine noted three young in it on 7 July. Earlier in the year, during a field meeting led by R. V. Goulding, members watched a male in display flight low over the Society's hut on 23 March. Cuckoos were more evident and A. Thomas watched a fledgeling being fed by a dunnock on Central Plain on 30 July. Other species seen or heard in Eastern Wood included tawny owl *Strix aluco* and collared dove *Streptopelia decaocto*. There were apparently eight nests of herons *Ardea cinerea* in adjacent woodland, of which five held young in April.

A nightingale *Luscinia megarhynchos*, which sang well from late April to mid May on the edge of Central Plain, appeared to move away, but one or two others continued to sing elsewhere. A wood warbler *Phylloscopus sibilatrix* was watched singing along Rydall Path on 19 May. A few lesser whitethroats *Sylvia curruca* were present in the scrub on the plains, a goldcrest *Regulus ignicapillus* sang in South-East Wood and a spotted flycatcher *Muscicapa striata* was seen in the same area. Turtle doves *Streptopelia turtur* seemed to be more plentiful again.

Two ring-necked parakeets *Psittacula krameri* flew across Eastern Plain on 16 June, which was almost as depressing as the pair of Canada geese *Branta canadensis* which trumpeted stridently during May on Upper Eastern Pond, but fortunately failed to breed, and the continued success of mandarins *Aix galericulata*. There was a pair of these feral, introduced ducks with juveniles on Eastern Hollow Pond in June, and C. B. Ashby saw as many as eight males and six females there on 10 November.

Other water-bird observations of note were: coots *Fulica atra* bred on Upper Eastern Pond and there was a pair on the Isle of Wight Pond; moorhens *Gallinula chloropus* bred on Lower Eastern and Western Hollow Ponds and possibly other ponds; mallards *Anas platyrhynchos* were seen with young on Eastern Hollow and Isle of Wight Ponds on 16 June; and outside the breeding season six teal *Anas crecca* were present on Upper Eastern Pond on 13 October and 10 on 3 November.

On 14 August C. B. Ashby saw a kestrel *Falco tinnunculus* and later a cormorant *Phalacrocorax carbo* in flight near the hut, and at dusk heard a tawny owl calling repeatedly in Hill House Wood. Winter visitors seen by him included *c.*50 redwings *Turdus iliacus* on Central Plain on 10 November and five redpolls *Acanthis flammea* in birches near the hut on 8 December.

Amphibians (C. B. Ashby)

Tom Langton, in his recent paper on the herpetofauna of the London Area (*L.N.* **70:** 97-123), observes that only 35 per cent of crested newt ponds are single-pond colonies and that most records come from 'continuous clusters of up to six ponds, close enough for newts to interchange between ponds ...' Crested newts *Triturus cristatus* have since the earliest years of the Survey been known to inhabit some of the ponds of the Common, and it has been suggested that the interlinked chain of five main ponds, which retain water in even the driest summers, may enable *cristatus* to recolonise the smaller ponds after they have seasonally become dry. One of the seasonal ponds is Crater Pond, about 100 metres north of the Society's hut, hidden in scrub and woodland. A. L. Panchen (*L.N.* **30:** 42-43) described *cristatus* as being numerous in this small pond in 1950, but the species could not be found there in 1977 by David Stiles (*L.N.* **57:** 64-65). In the interval, an excessive growth of willows and aquatic vegetation had led to its being cleared, and the scrub cut back, in 1962 and 1972. The pond dried out in 1990, and in some previous years, and although smooth newts were often present, of *cristatus* there was no sign. It is therefore of interest to record that a gilled larva of the crested newt was found in the shallow water of this pond on 7 July 1991.

Palmate newts *Triturus helveticus* are described by Langton (ibid.) as being almost as scarce as *cristatus* in the London Area. The species has been recorded at Bookham, from Sheepbell and other ponds, in 1950, 1977, 1982 and 1987. Panchen (ibid.) described it as fairly common in the Isle of Wight Pond and numerous in Crater Pond. The Isle of Wight Pond today bears small resemblance to the pond of that name studied by Panchen in 1950, and if the palmate lives there still it does so without our knowledge.

A male in full breeding attire was found in Sheepbell Pond on 23 March 1991. Females are often thought to be not separable in the field from *Triturus vulgaris*, so that David Stiles' recommendations for separating them may be repeated with advantage: '... of about 200 palmate newts which I have captured in Berkshire and Surrey, every one has shown one or two small whitish spots on each leg near the foot, so that their presence may be a useful distinguishing feature'.

Book Reviews

The Wren, by Edward A. Armstrong, ISBN 0 7478 0160 6; *The Common Toad*, by Fred Slater, ISBN 0 7478 0161 4; and *The Mole*, by R. David Stone, ISBN 0 7478 0171 1. Shire Publications, Princes Risborough. 1992. 24 pp. £1.95 each.

I was pleased to be asked to review these three titles which are Nos. 59, 60 and 61 respectively of the well-known range of Shire booklets on natural history and archaeology. They present a fascinating window into these subjects and excite the reader's desire to find out more.

The Wren starts with an introductory chapter in which are interesting fables, customs and folklore. Other wrens of the world and various of their subspecies are described, but in Europe there is only one species living in a wide range of habitats. The range and lifestyle is the subject of the second chapter, and distribution, dispersal and migration are dealt with, supported by distribution maps for the British Isles and world-wide. There are some delightful colour photographs in the central pages and black-and-white photographs throughout. Calls and song follow in the third chapter, whilst finally the reader learns about breeding and this is followed by suggestions for further reading. Altogether this is a concise introduction to the wren and is well worth the purchase price for those commencing the study of British birds.

The Common Toad introduces the reader to this amphibian's biology, breeding habits, terrestrial and aquatic life, predators and diseases. There is a chapter on conservation and an addendum with suggestions for further reading. There are many colour photographs throughout. This title is a worthy addition to the Shire range and is especially recommended for the budding herpetologist.

The Mole takes a comprehensive peep into the life of the furry little gentleman in the black velvet jacket. ['I like your clothes awfully, old chap,' he remarked, '... I'm going to get a black velvet smoking-suit myself some day, as soon as I can afford it.' *The Wind in the Willows*]. The physical characteristics and skeletal details are given and other chapters describe the burrows, diet and feeding activities, and behaviour. The final chapter deals with moles and man, explaining why moles are not looked upon favourably by man for various economic reasons that the farmer and gardener fully appreciate. It is emphasized that man is still the greatest threat to moles (as in fact man is to wildlife in general). However, as a naturalist I feel that the mole is an engaging little mammal which has been dealt with sympathetically in this book. The pages are liberally seasoned with coloured photographs, and I would not hesitate to recommend it to the reader.

R. V. GOULDING

A Further Bibliography of the Natural History of Bookham Common, Surrey

By C. B. Ashby* and Eric W. Groves**

Introduction

Beven (1968*b*) based his *Bibliography of the natural history of Bookham Common* on the annual Progress Reports and other papers published in *The London Naturalist* up to and including No. 46, together with relevant contributions in other journals. Groves (1968) gave details of field meetings held on the Common by the South London Entomological and Natural History Society from 1902 to 1967.

The present contribution covers the years 1967 to 1991 and is in three parts:

Part 1. Papers in *The London Naturalist*
Part 2. Papers in other publications
Part 3. Progress Reports in *The London Naturalist*

The Progress Reports, which have appeared annually in *The London Naturalist,* contain on-going assessments of the vegetation and the changes brought about by a variety of causes, besides notes on new discoveries and a record of conservation and management. All vertebrate and many invertebrate groups are discussed and updated in the Reports, which include also year-by-year accounts of the population studies. Selected references to this treasure-house of information were given in the 1990 review (Ashby, *L.N.* **70:** 9-28).

Part 1 – Papers in *The London Naturalist* Nos 47-71, 1967-1991

These were published from 1968-1992, therefore the date for each paper given below is the year of publication.

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TOWNS, M. 1973. See Le Gros, A. E. and Towns, M.

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Part 2 – Publications other than in *The London Naturalist*

(a) Direct references

Anon. 1970. *Bookham Common Nature Trail.* LNHS. An eight-page cyclostyled guide prepared for visitors to the Nature Trail held on the Common 18-19 July 1970. It indicated what might be seen from each of seven guide-posts set out at various points on the Common (see *Lond. Nat.* **50:** 98-99).

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SOUTHWOOD, T. R. E. 1957. Notes on some mirids (Hem.) collected on Bookham Common. *Entomologist* **90:** 301-303.

STUBBS, A. E. 1972. (Report of a field meeting on Bookham Common, 15 August 1971; with especial reference to Diptera: four species new to the London area.) *Proc. Trans. Br. ent. nat. Hist. Soc.* **4:** 126-127.

THORLEY, A. S. n.d. [*c.*1989]. The Arboretum. The Bookham Common Local Management Committee of The National Trust. A list of 66 shrubs and trees occurring on Bookham Common, examples of which have been brought together and planted in a two-acre plot set aside as an arboretum.

UFFEN, R. W. J. 1970. (Report of a field meeting on Bookham Common, on 21 September 1969.) *Proc. Trans. Br. ent. nat. Hist. Soc.* **3:** 55-56.

WILLMOTT, K. J. 1987. *The ecology and conservation of the purple emperor butterfly.* A report on project BSP/2 for the World Wildlife Fund, 1984-1986. A special survey of the habits of this species in various localities, but mainly on Bookham Common.

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(b) Incidental references

Anon. 1970. *Conservation in Surrey: an appraisal of selected open spaces.* Report of a working party. S.E. Regional Office, The Nature Conservancy. Describes (pp. 22-23) Bookham Common, giving a brief vegetational description followed by three management proposals which include the suggestion of introducing grazing or annual mowing on parts of the grassland, and cutting the scrub; cutting of glades and more firebreaks to reduce fire risk; and clearance of encroaching vegetation around the ponds. A map (based on the O.S. 1:25,000) is also given on which the boundaries of Great, Little and Banks Commons are indicated.

BURTON, J. A. 1974. *The naturalist in London.* David and Charles, Newton Abbot. Pp. 106 & 109-110 give a précis of the vegetation of the Common, especially the Plains. Totals (at the time of writing) are given for the flowering plants, lichens, fungi, butterflies, dragonflies and grasshoppers; concluding with those for the 'het-bugs' and plant galls. The author also highlights some of the interesting birds, mammals, reptiles and amphibians that may be observed on the Common.

COMMITTEE OF THE LONDON NATURAL HISTORY SOCIETY, 1957. *The birds of the London area since 1900.* Collins, London. In the chapter entitled 'Commons, Downs and Parkland' R. C. Homes notes the presence before the 1939-45 war of a varied community of birds on the Common. The book has two black-and-white photographs taken by C. B. Ashby in 1955: Plate 18a Central Plain, Plate 20b Central Wood.

COMMITTEE OF THE LONDON NATURAL HISTORY SOCIETY, 1964. *The birds of the London area.* A new revised edition with information for the years 1955 to 1961. Hart-Davis, London. Mentions (p. 312) the increase in the population on the Common of the reed bunting, 'doubled in the last ten years' (i.e. 1951-61).

CRAMP, S. (Ed.) 1988. *The birds of the western Palearctic* **5.** Oxford University Press. References on p. 1028 acknowledge use made of G. Beven's papers on the Bookham research into bird feeding sites and populations in *Lond. Nat.* **38:** 64-73; **43:** 86-109; and **55:** 23-42.

DREWETT, J. 1987. *The nature of Surrey.* Barracuda, Buckingham. The wood warbler (p. 22) and the turtle-dove (p. 58) are mentioned for the Common, the latter as nesting. A note (p. 58) refers to 'a rolling system of management' adopted on the Common, where 'areas of tall scrub' are cut out allowing small scrub to regenerate in their place. 'The small growth is then cleared from the grassland to the benefit of that habitat. In this way a wide range of ages is maintained and no overall loss of habitat occurs'. The garden warbler is mentioned (p. 59) as a summer visitor.

EVANS, J. A. 1967. The woodlands of the Great Bookham area 1790 to 1840. *Proc. Leatherhead Dist. loc. Hist. Soc.* **3**(1): 27-32.

FITTER, R. S. R. 1945 (reprinted 1984). *London's natural history.* Collins, London. Mentions (p. 109) that the nightingale occurs on the Common.

FITTER, R. S. R. 1963. *Wildlife in Britain.* Pelican, London. Includes on pp. 115-116 a general account of the 'long-standing survey', with especial reference to the 19th Progress Report (1960).

HARRISON, C. J. O. 1960. The food of some urban tawny owls. *Bird Study* **7:** 236-240. Quotes results of a study based on pellets collected at Bookham Common; Progress Report (G. Beven) in *Lond. Nat.* **38:** 58-60.

HENDERSON, J. L. 1961. *Chaetocnema aerosa* Letzner (Col., Chrysomelidae) in Britain. *Entomologist's mon. Mag.* **97:** 259.

LOUSLEY, J. E., 1976. *Flora of Surrey.* David and Charles, Newton Abbot. Makes reference (p. 70) to the threat horse-riding presents to path-side flora on several commons in Surrey, including Bookham, 'as the horses diverge more and more from the track they have made impassable, the vegetation destroyed is considerable.'

MONTIER, D. J. (Ed.), 1977. *Atlas of breeding birds of the London area.* Batsford, London. Twenty-four references are made to Bookham Common under different birds mentioned in this book.

PALMER, W. T. 1951. *Odd corners in Surrey.* Skeffington, London. Under a paragraph headed 'Great & Little and Banks Commons' (p. 234) it is stated that 'The oaks here were mentioned in 1538 when Nonsuch Palace was planned, and the area was included in the "Wastes and Commons" Survey of 1614. The Common has at least 15 ponds (several of them relics from the works of the Surrey iron industry) and many ditches covering three acres in winter. More than half is oakwood, the rest grassland.'

PARR, D. (Ed.), 1972. *Birds of Surrey, 1900-1970.* Batsford, London. Reference to the birds on the Common (p. 54) is based on the papers of Beven (1963, 1971), and under the section dealing with the tawny owl (p. 170), the pellet investigation on the Common by Beven (1967) is also quoted. Plate 7 is a photograph taken within the woods by D. M. T. Ettlinger.

PLANT, C. W. 1987. *The butterflies of the London area.* London Natural History Society. Nine species accounts include references to Bookham Common.

SIMMS, E. 1971. *Woodland birds.* Collins, London. Table 21 (p. 190) lists 18 species of birds and their feeding preferences in various trees and shrubs in the grassland scrub on the Common is taken from Beven's paper in *L.N.* **43** (1964). Ten other references are made by the author to Bookham Common.

SIMMS, E. 1978. *British thrushes.* Collins, London. References on pages 166, 188.

SOUTHERN, H. N. 1970. The natural control of a population of tawny owls. *J. Zool., Lond.* **162:** 197-285. Reference to 'The food of tawny owls in London' (including oakwood at Bookham Common by Beven (1965). *Lond. Bird Rep.* **29:** 57-72.

STEP, E. 1894. *Planorbis nautileus* in Surrey. *Sci. Gossip* (NS) **1:** 45.

TAYLOR, D., WHEATLEY, J. and PRATER, T., 1987. *Where to watch birds in Kent, Surrey and Sussex.* Christopher Helm, London. Bookham Commons (Great and Little) are mentioned (p. 123) with a brief description of vegetation cover. Not all species of birds are cited. On a map of Central Surrey Commons (p. 249) the Bookham Commons are indicated.

VARDEY, E. (Ed.) 1988. *History of Leatherhead.* Leatherhead, Surrey. Mention is made on p. 249 that during the summer of 1944 in the Second World War a German V1 ('doodle-bug') landed on Bookham Common.

WOOLDRIDGE, S. W. and HUTCHINGS, G. E., 1957. *London's countryside: geographical fieldwork for students and teachers of geography.* Methuen, London. The authors describe 12 excursions around the Metropolis on which teachers could lead students on geography 'field-days'. The first part of the third excursion given under Chap. III passes across Bookham Common, from the gate at the Station up-platform to Chesmore stream by Hundred Pound Bridge.

YALDEN, D. W. and JONES, R. 1970. The food of suburban tawny owls. *Naturalist, Hull* **914:** 87-89. Refers to two papers by Beven on food of tawny owls in *Lond. Bird Rep.* **29** and *Surrey Bird Rep.* **14.**

YALDEN, D. W. 1985. Dietary separation of owls in the Peak District. *Bird Study* **32:** 122-131. Refers to papers by Beven on food of tawny owls in *Surrey Bird Rep.* **14** and *Lond. Nat.* **61:** 88-94.

YAPP, W. B. 1955. The theory of line transects. *Bird Study* **3:** 93-104. Reference to 'The bird population of an oakwood in Surrey' by Beven (1951). *London. Nat.* **30:** 57-72.

YAPP, W. B., 1962. *Birds and woods.* Oxford University Press, London. Has four references to Bookham Common citing the work of the Survey's ornithologists in the pedunculate oaks of Eastern Wood, written up in Beven's two papers, 1951, 1953. These are listed in Beven (1986*b*), given in Part 1, above.

Part 3 – Progress Reports in *The London Naturalist* Nos 47-71, 1967-1991

The dividing line between 'papers' and Progress Reports has over the years become indistinct. As will be seen from the following, many valuable studies and up-dates of previous accounts have been published in the Progress Reports and have therefore been omitted from the annual contents lists of *The London Naturalist.* Meteorological notes are included in some Reports.

26th year (1967) – *L.N.* **47:** 87-94.
Vegetation *CPC, FCR.* Myxomycetes: complete list *PCH.* Coleoptera *GB.* Lepidoptera *CBA.* Turbellaria, Hirudinea, Ostracoda, Cladocera, Copepoda *GB,* (*JWC*). Fish *GB, JC.* Grass snake *GB.* Birds: census results *GB*; other bird notes *GB.* Mammals *GB.*

27th year (1968) – *L.N.* **48:** 126-134.
Vegetation *FCR.* Surface drainage *GB.* Fungi *PCH.* Coelenterata *AELeG.* Nematoda *JWC.* Oligochaeta *JWC.* Cladocera *JWC, AELeG.* Ostracoda *WAS.* Copepoda *WAS.* Amphipoda *RWI.* Lepidoptera *CBA.* Hymenoptera *AELeG.* Birds: census results *GB*; other bird notes *GB.* Birds feeding on plant galls *GB.* Mammals *GB.*

28th year (1969) – *L.N.* **49:** 93-104.
L. Parmenter's index of the 1,140 species of Diptera on Bookham Common deposited at BM(NH). Increase of bracken and scrub *CPC.* Vegetation of the plains after cutting grass and bracken *EMH.* Coelenterata *AELeG.* Turbellaria *AELeG.* Nematoda *JWC.* Rotifera *JWC.* Hirudinea *GB.* Crustacea. Brachiura *WAS.* Arachnida *AELeG.* Psocoptera *AELeG.* Lepidoptera *GB.* Hymenoptera, list of wasps: 41 species with data *PWEC.* Insect visitors to flowers *AELeG.* Birds: census results *GB*; other bird notes *GB.* Rabbit survey *MT.*

29th year (1970) – *L.N.* **50:** 98-108.
Nature trail as a contribution to European Conservation Year. Revision of the flora *EMH.* Effects of cutting bracken and grass, *Ruscus aculeatus* survey *EMH.* Freshwater algae *AELeG.* Turbellaria, Oligochaeta, Cladocera *JWC.* Lepidoptera *GB.* Collembola *AELeG.* Gall wasps, Cynipidae *AELeG.* Chalcids and spiders *AELeG.* The water-spider *AELeG.* Fish: common carp *BSM.* Birds: census results *GB*; other bird notes *GB.* Hawfinches *CH.*

30th year (1971) – *L.N.* **51:** 39-44.
Pollution of Bookham Stream and River Mole *GB.* The ponds: conservation and management: *Ruscus aculeatus* survey *EMH.* Mecoptera, Diptera *AELeG.* Pitfall trapping *MT.* Birds: census results *GB*; other bird notes *GB.* Mammals *MT.*

31st year (1972) – *L.N.* **52:** 72-81.
Draining of Isle of Wight Pond and formation of island *GB.* Fish transferred to other ponds *GB.* vegetation: management *EMH.* Notes on orchids, etc. *EMH.* Restoration of Crater Pond *EMH.* Pond biology *AELeG.* Crustacea, Amphipoda *AELeG.* Other Crustacea *JWC.* Arachnida, Araneae *AELeG.* Chalcids and spiders *AELeG.* Insecta: Hemiptera, Mecoptera, Microlepidoptera *AELeG.* Birds: population studies *GB*; status of marsh and willow tits *GB.* Other bird notes *GB.* Woodchat shrike, addition to checklist in *L.N.* **42:** 98-100 *GB.*

32nd year (1973) – *L.N.* **53:** 71-78.
Revision of Survey base-map *HAS.* Vegetation: Eastern Plain, dry heath association, high soil acidity, *Ruscus aculeatus* survey *EMH.* List of brambles *ACL.* Crater Pond, the Plains *EMH.* Regeneration in the Isle of Wight Pond *AELeG.* Freshwater invertebrates *JWC.* The medicinal leech *AELeG.* Diptera, additional species *AES.* Birds: population studies *GB*; status of the blackcap and garden warbler *GB*; other bird notes *GB.*

33rd year (1974) – *L.N.* **54:** 38-48.
Freshwater algae *AELeG*. Vegetation: Umbelliferae Juncaceae, Cyperaceae, Gramineae *RCS*. Crustacea, Cladocera: notes for 1971 and 1974; checklist, with data *JH*, Entomostraca *JWC*. The medicinal leech *EWG*. Lepidoptera *KJW*. Chalcids *AELeG*. Birds: population studies *GB*; other bird notes *GB*. Mammals *GB*.

34th year (1975) – *L.N.* **55:** 19-22.
Ruscus aculeatus survey *EMH*. Conservation, Eastern Plain, gun-pits and craters, Fungi. *EMH*. Hepatics *AELeG*. Crustacea, Cladocera *JH*. (NB – for 1967 on p. 20 read 1975). Copepoda *JH*. Birds: population studies *GB*; other bird notes *GB*. Mammals *GB*.

35th year (1976) – *L.N.* **56:** 71-74.
Conservation management *GB*. Bryophytes, list of additions, with data *RCS*. Insecta: Ephemeroptera *BFA*, Lepidoptera *GB*. Birds: population studies *GB*; breeding habitat of whitethroat and lesser whitethroat *GB*; other bird notes *GB*. Mammals *GB*.

36th year (1977) – *L.N.* **57:** 61-66.
Fungi, up-to-date list *PCH*. Conservation and management: clearance of South-East Pond, coppicing of hazel in Eastern Wood *GB*. Vegetation: the ponds and hollows after conservation management *GB, BRR*. Bryophytes *RCS*. Coleoptera *RAJ*. Amphibia, newts, a pond survey *DS*. Birds: population studies *GB*; other bird notes *GB*. Mammals *GB*.

37th year (1978) – *L.N.* **58:** 38-43.
Conservation management *GB*. Vegetation, assessment of long-term change *BRR*. Bryophytes *RCS*. Aquatic invertebrates, ponds compared *BFA*. Fish *GB*. Birds: population studies *GB*; status of doves *GB*; other bird notes *GB*. Mammals *GB*.

38th year (1979) – *L.N.* **59:** 60-65.
Route and excavation of sewer pipeline; threat to *Carex strigosa GB, BRR*. Re-survey of all vascular plants *BRR*. Bryophytes *RCS*. Coleoptera: beetles associated with elm trees *RAJ*. Birds: population studies *GB*; food of long-eared owls in winter *GB*; other bird notes *GB*. Mammals *GB*.

39th year (1980) – *L.N.* **60:** 64-67.
Vegetation; selected records *BRR*. Knopper galls *BRR*. Fungi *EMH*. Bryophytes *RCS*. Lichens *JRL*. Annelida: Oligochaeta *JWC*. Crustacea: Cladocera, Copepoda *JWC, GAB*. Birds: population studies *GB*; other bird notes *GB*. Mammals *GB*.

40th year (1981) – *L.N.* **61:** 95-99.
Taking stock at 40 years *GB*. Vegetation: noteworthy finds *BRR*. Regeneration on course of pipe-line *BRR, KFP*. Fungi *EMH*. Bryophytes *RCS*. Lepidoptera *GB*. Reptiles: slow-worm, viviparous lizard, grass snake, adder *GB*. Birds: population studies *GB*; other bird notes, Cetti's warbler *GB*; the status of the magpie and its possible effect on the numbers of small birds *GB*. Mammals *GB*. Platyhelminthes; Turbellaria; Tricladida *JHB*. Annelida; Hirudinea *JHB*. Arachnida; Hydracarina *JHB*.

41st year (1982) – *L.N.* **62:** 88-96.
Vegetation: *Juncus* × *surrejanus, Mimulus guttatus BRR*. Bryophytes *OBJF*. Fungi *PG*. Platyhelminthes, Turbellaria *JHB*. Aschelminthes: Rotifera *CGH*. Nematoda *JWC*. Hirudinea, Gastropoda, Crustacea *JHB*. Coleoptera: the glow-worm *GB*. Amphibians and reptiles *GB*. Adders *OBJF*. Birds: population studies *GB*; other bird notes *GB*; rooks, jackdaws, carrion crows *GB*. Mammals *GB*.

42nd year (1983) – *L.N.* **63:** 124-132.
Vegetation: microspecies of *Rubus fruticosus BRR, VP, KFP, ACL*. Fungi *PG*. Aquatic invertebrates: Protozoa, Coelenterata, Aschelminthes: Rotifera, Nematoda, Copepoda, Cladocera, Amphipoda *JWC, GAB*. Arachnida: Araneae: damselfly as prey of *Tetragnatha striata EWG*. Lepidoptera *GB*. Fish *GB*. Amphibians *GB*. Birds: population studies *GB*; other bird notes *GB*; Status reports: woodcock, pipits and wagtails, grasshopper warbler, wood warbler *GB*. Mammals: grey squirrels, roe-deer *GB*. Status of the water-vole *GB*.

43rd year (1984) – *L.N.* **64:** 103-112.
Note by D. Longhurst on grazing (*c.*1900-30) by cattle on the plains, sheep in the woodlands; also geese and gipsies' horses; ceased 1949 *GB*. Conductivity readings (indicating trophic status) of 11 water-bodies *JHB*. Vegetation: *Bromus commutatus* re-found after 30 years *OM, BRR*; other finds *BRR*. Bryophytes: 21 taxa recorded from new sites *OBJF*. Odonata *GB*, Lepidoptera *GB*. Amphibia *GB*. Birds: population studies *GB*; other bird notes *GB*; status reports: little grebe, Scolopacidae, Rallidae, starling roosts *GB*. Mammals *GB*.

44th year (1985) – *L.N.* **65:** 181-192.
Buckthorns *KFP*. Knopper galls *EMH*. Bryophytes *OBJF*. Fungi *PG*. Aquatic invertebrates: Annelida, Oligochaeta *JWC*. Freshwater Protozoa: Dinophyceae *JWC*. Insecta: Odonata, Coleoptera *GB*. Macrolepidoptera *DAB*, Microlepidoptera *GB*. Fish *GB*. Amphibia *GB*. Birds: population studies *GB*; Other bird notes *GB*. Status reports: Anatidae, Strigidae *GB*. Mammals *GB*. Molluscs in the Isle of Wight Pond *RL*.

45th year (1986) – *L.N.* **66:** 157-166.
The Birches and Hundred Pound Wood acquired by National Trust. The ecology of the Isle of Wight Pond and Lower Eastern Pond *AM*. Bryophytes *OBJF*. Willow hybrids *KFP*. Fungi *PG*. The medicinal leech *GB*. Lepidoptera *GB*. Amphibia *IFS*. Status report: grass snake *GB*. Birds: population studies *GB*; other bird notes; first nesting of heron; status reports: Laniidae, Bombycillidae, Fringillidae, Emberizidae *GB*. Mammals: foxes fighting over territory; roe-deer now established, status of brown hare *GB*.

46th Year (1987) – *L.N.* **67:** 147-159.
Storm damage (October 1987) *IFS*. Ancient woodlands; indicator species *BRR*. Fungi *PG, PCH*. Bryophytes *OBJF*. Aquatic invertebrates: Coelenterata, Nematoda, Rotifera, Oligochaeta *JWC*; Hirudinea *GB*. Lepidoptera: status and ecology of *Apatura iris KJW*; list of moths (*ASW*, 1955) up-dated *CBA, GB, GAC, ASW*. Diptera: Syrphidae *GB, GAC*. Birds: population studies *GB, AM*; other bird notes *GB*; status reports: buzzard, Turdinae, the chat-like thrushes *GB*. Call-notes of jays *GB*. Mammals: roe-deer and young pursued by greyhounds; status of the hedgehog *GB*. Odonata: third year of a population study *RD*.

47th year (1988) – *L.N.* **68:** 133-146.
Scope for future enquiries *GB*. Conservation and management *IFS*. Changes in the fern population *KFP*. Fungi *PG*. Aquatic invertebrates: Protozoa, Coelenterata, Rotifera, Amphipoda, Diptera *JWC*. Birds: population studies *GB*; other bird notes *GB*; ecology and status reports of Fringillidae: chaffinch, brambling, greenfinch, siskin, goldfinch, linnet, redpoll, crossbill, bullfinch, hawfinch *GB*. Mammals: weasel, badger and cubs; roe-deer killed by greyhounds; status of harvest-mouse and dormouse *GB*. Odonata, population study, 4th year *RD*. Butterflies, their present status compared with 1955 *ASW*.

48th Year (1989) – *L.N.* **69:** 119-137.
New hut erected. Conservation, reasons for management *IFS*. Cattle grazing reintroduced: establishment of study quadrats in grazed area *BRR*. Plants of interest *BRR*. Fungi *PG*. Some exercises in limnology: freshwater algae, Protozoa, Coelenterata: Hydrozoa, Rotifera *CBA*. Insecta: Neuroptera, Lepidoptera *GB*; Coleoptera, newly discovered species *ISM*; Odonata, population study, 5th year *RD*. Sheepbell Pond, effects of clearance *RD*. Amphibians and reptiles *GB*. Birds: population studies *GB*; other bird notes *GB*; ecology and status reports of Sylviinae, Old World warblers; Fringillidae, chaffinches in woodland *GB*. Mammals: badger, roe-deer; grey squirrels: some of the food taken in woodlands *GB*.

49th year (1990) – *L.N.* **70:** 125-140.
Liaison with other societies. Seven one-day courses run by Survey Team members. Aerial photographs (22) of the survey area commissioned by the Society. Vegetation: 18 naturally occurring hybrids now established *KFP*. Freshwater algae *CBA*. Fungi *PG, PCH*. Aschelminthes: Rotifera, a checklist of species 1941-1990; Gastrotricha, 23 species listed for the first time, including five species new to Britain *LVM*. Crustacea, Cladocera *CBA*. Orthoptera: recent records *ISM*; some early records *EWG*. Hemiptera-Heteroptera *ISM*. Coleoptera *ISM*. Lepidoptera *ISM*. Odonata: population study, 6th year *RD*. Birds: population study *AM, RHK*. Other vertebrates *AM*.

50th year (1991) – *L.N.* **71:** 157-168.

The Progress Report for the fiftieth year of our continuing survey is published in this issue of *The London Naturalist*, pages 157-168.

Management requirements: woodland and wetland areas *IFS*. Vegetation: woundwort *Stachys* hybrids *KFP*. Fungi *PG*. Tardigrades *CBA*. Insects: Orthoptera, Hemiptera – Heteroptera, Coleoptera *ISM*; Odonata *RD*. Birds: Common Birds Census, other observations *RHK*. Amphibians: newts *CBA*.

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The full set of *The London Naturalist* may be consulted in the Society's library, housed as a separate sequence in the Life Sciences section of the Lyon Playfair Library, Imperial College, South Kensington.

Book Review

The Wild Flowers of Luton. By John G. and Christina M. Dony. Edited by Chris Boon. 64 pp. plus centrefold map of the Luton area by Peter Ellison. Published by the authors, 1991. £3.50 post free from (and cheques payable to) P. J. Ellison, 90 Beverley Road, Ruislip, Middlesex HA4 9AS. No ISBN.

This attractively produced booklet presents valuable data on the occurrence of wild flowers in Bedfordshire's largest conurbation. The text concentrates on some 25 sites within the area, some of these subdivided into two or more ecological units. The history, ownership and past and present land-use of these sites are briefly summarised, along with lists of their most interesting species and a 'plant rarity factor', which gives a quantative indication of the relative importance of the sites within the county.

This section is followed by an annotated list of the ferns and flowering plants recorded for the area. The document is to be commended for the evidence it contains should any of the sites come under threat, as well as being of great interest to all local botanists.

P. C. Holland

Botanical Records for 1991, With Some Notes on Common Species

By Rodney M. Burton*

Introduction

This paper continues the annual series of papers in *The London Naturalist*, presenting the most noteworthy records of vascular plants made by members of the London Natural History Society and others in the previous year. The criteria for inclusion of records were described in detail last year (Burton 1991). The geographical sequence of the paper depends on the vice-county numbering system devised by Watson (1873). Where a vice-county includes territory both in and outside the London boroughs, the more central records are presented first.

V.C. 16, West Kent

We start, therefore, with records from the London Boroughs of Lewisham, Woolwich, Bexley and Bromley. I must first mention two species reported by John Archer of the London Ecology Unit, one native, the other alien, which appear to have been favoured by the run of dry summers which was continued by that of 1991. The native species is soft clover *Trifolium striatum*, of which three sizeable patches were found on Blackheath, none of them where I knew it over 20 years ago. The alien is *Conyza sumatrensis*, the spread of which, mostly north of the Thames in the last few years, has been well documented; it is now increasing rapidly in south-east London also. In addition to Mr Archer's records, most notably from the railway between New Cross and St John's where it is abundant, there are also several scattered around Bexley, mostly by Mike White who surveyed that Borough in 1991. Another species which seems to have had a good year, at least in Bromley, is blinks *Montia fontana*; I found it on a private lawn at Chislehurst and on Keston Common where I have not seen it before, and Joyce Pitt found it very abundantly in hollows in an arable field north of Bromley Common. Other former fields further south, now sown leys, yielded masses of our two native pansies *Viola arvensis* and *V. tricolor* and hybrids between them for Mrs Pitt, who also verified a record of bird cherry *Prunus padus* in ancient woodland in the vicinity of Bromley Common. Continuing his search for salt-marsh plants on salted roadsides, which has generally been more rewarding further out of London, Geoffrey Kitchener found a stretch of the Sidcup Bypass, which forms the boundary between Bexley and Bromley, with on one side *Puccinellia rupestris* plentiful for two metres and two plants of *Hordeum jubatum*, and on the other *Spergularia marina* for about four metres. The *Hordeum* was said to be 'frequent' in this locality by John Palmer, whose other records include three from Bexley. By a footpath on Crayford Marshes there was *Medicago sativa* subsp. *glomerata*, distinguished by its yellow flowers and legumes of more than one and a half turns; *Artemisia pontica* was on a pavement at Barnehurst; and a bird-sown *Cotoneaster obtusus* was among native bushes on Barnehurst Golf Course.

For many years most of the records from the Kent part of our area have been contributed by Mr Palmer, and 1991 is no exception. In last year's report reference was made to a plantation of small trees east of Swanley which had produced some unusual alien plants. The occurrence in the same locality of cornflower *Centaurea cyanus* and corn marigold *Chrysanthemum segetum*, as well as yellow-rattle *Rhinanthus minor*, chamomile *Chamaemelum nobile*, not to mention such horticultural subjects as love-in-a-mist *Nigella damascena*, and two varieties of godetia *Clarkia amoena*, is a clear indication of deliberate introduction to this locality. Also there was *Senecio erucifolius* var. *subintegrifolius* Druce, a variety of hoary ragwort with almost unlobed leaves. In the chalkpit east of Stone church Mr Palmer found cornflower, corn marigold and corn-cockle *Agrostemma githago* together with the continental *Anthemis austriaca*, implying that suppliers of 'wild flower seed' are confusing the latter white mayweed with some native species. His discovery of yellow horned-poppy *Glaucium flavum* on ditch dredgings half a mile from the present tideway at Greenhithe, evidently from long buried seed, has already been reported by him in *BSBI News* (**59:** 9). Also in Greenhithe, even on pavements of the High Street, he found annual beard-grass *Polypogon monspeliensis.* Above the now abandoned Merchant Navy College, away from the main chalk area (see later in this paper) he found stemless thistle *Cirsium acaule.* Two unusual hybrids found by Mr Palmer at Swanscombe are worth a mention. By a footpath there was the cross between common and sea couch, now to be called *Elytrigia* × *oliveri*; this is male-sterile and has intermediate leaf anatomy. On waste ground, formerly a tip, in an area which has a relatively long-established population of *Conyza sumatrensis*, there was its hybrid with the Canadian fleabane *C. canadensis*, which is intermediate between the two species in various ways, notably in indumentum characters. The same site was the habitat *inter alia* of ripgut brome *Bromus rigidus* and hard-grass *Parapholis strigosa.* On Littlebrook Marshes he found blunt-flowered rush *Juncus subnodulosus*, brackish water-crowfoot *Ranunculus baudotii* and an assortment of willows. At Sutton-at-Hone he found rescue brome *Bromus catharticus.* With Mr Kitchener and Eric Philp on Swanscombe Marshes, Mr Palmer re-discovered slender hare's-ear *Bupleurum tenuissimum* as a native plant in the London Area, and confirmed the continued presence of common sea-lavender *Limonium vulgare.*

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Apart from Mr Palmer's, there are 1991 Kent records from Mr Kitchener, Mrs Pitt and myself. Mr Kitchener's account of his discoveries of *Epilobium* hybrids has appeared in *Transactions of the Kent Field Club* (Kitchener 1991). He found sea club-rush *Scirpus maritimus* along 50 yards of the Swanley By-pass, and *Parapholis strigosa*, which in nature is a plant of the margins of salt marshes, was another abundant denizen of this artificially salty habitat. Mrs Pitt saw masses of a sea-spurrey *Spergularia* sp. near the roundabout at the end of this By-pass, but from a car in a place where it was impossible to get out in order to identify the species. She also reported meadow saxifrage *Saxifraga granulata* from Riverhead at the edge of our area; like most of the plants of this declining species in the Darent valley further north, it was in churchyard grass. Like Ken Page in Surrey and Peter Ellison in SW Herts, I was struck by the increase of great lettuce *Lactuca virosa* in 1991, whereas the pondweed *Potamogeton perfoliatus* has probably gone from the river Darent, long stretches of which were without water in the summer of 1991, as they are still as I write in February 1992. My only new find of note in this part of the world was on the new golf course at Upper Austin Lodge, where about 2,000 plants of *Crepis tectorum* had come up in sown rye-grass. This alien had evidently been imported with the seed, which is similar in size and shape to its own fruits, and can be expected to persist in reduced quantity for a year or two around the edges of the roughs.

V.C. 17, Surrey

The most urban locality south of the Thames in London which produced an unexpected flowering plant record in 1991 is certainly the rough grass at Peckham Rye where Brian Wurzell found a lot of *Erodium moschatum.* However even more central is the lawn in front of the Imperial War Museum in which Mike Mullin found *Ranunculus sardous.* This buttercup still occurs in reasonable quantity near the Thames below London and occasionally elsewhere, but I do not know if it survives in the lawn at County Hall not very far from the Museum where it was fairly plentiful a few years ago. *Conyza sumatrensis* is now quite abundant near the Imperial War Museum, but Mr

Kitchener has furnished a record of this rapidly increasing alien well established much further out, in Richmond. Mr Mullin was invited to explore the site of Barn Elms Reservoir and found a range of interesting plants in a sand filter bed, including *Eleocharis uniglumis* and *Alisma lanceolatum.* This site is being re-developed as a housing estate in the north part and a wildfowl sanctuary in the larger south part, where it is hoped to preserve at least the *Eleocharis* which is a rare plant in south-east England, last seen in the London Area 40 years ago.

Most of the other Surrey records which I ought to mention were from the Greater London portion of the vice-county. Mr Archer found meadow saxifrage *Saxifraga granulata* in East Sheen Cemetery and in The Copse, Petersham; in the former locality it had been seen previously by Mrs Welch in 1955. John Latham reported naturalised pampas grass *Cortaderia sellowana* and an abundance of *Cotoneaster salicifolius* with other cotoneasters on the disused drying beds of Kew sewage works. In 1990 Peter MacPherson, on a visit to London, found a single plant of Tintern spurge *Euphorbia serrulata* on the Thames path outside the Royal Botanic Gardens, from which the seed had perhaps sprung. A new member Ms C. FitzSimmons found a bee orchid *Ophrys apifera* on Wimbledon Common in 1991. Mary Brayley saw cut-leaved dead-nettle *Lamium hybridum* in the grounds of Springfield Hospital, Tooting. Mr Latham mentioned a dense roadside stand of Scotch thistle *Onopordum acanthium* at East Croydon, and at Purley I saw a good population of land-cress *Barbarea verna* on a bank south of the station.

Our best records from that part of our area which is still in Surrey were made at the July meeting of the Surrey Flora Committee, at Oxted. In several places on the chalk they found the rare grass *Bromus benekenii* which has not previously been recorded from this part of the area. At the edge of Great Church Wood, an old locality for the small teasel *Dipsacus pilosus* which has been searched in vain for it in subsequent years produced a single plant, the first since 1977. In a chalkpit were five plants of *Buddleia nanhoensis*; this is scarcely a species distinct from the familiar butterfly bush *B. davidii*, from which it is separated by its narrower leaves and cylindrical inflorescence. These records are taken from the Committee's *Newsletter*, which for very many years has been excellently written by Joyce Smith. Mrs Smith alone found maiden pink *Dianthus deltoides* well naturalised on M.o.D. property at Fairmile.

V.C. 18, South Essex

Undoubtedly the most interesting plant fround in the Essex portion of London in 1991 was the dock hybrid *Rumex cristatus* × *palustris*, shown by F. J. Rumsey as new to Britain at the annual BSBI exhibition. This was found near the parent species by a drainage ditch on the Essex marshes.

Outside London, Ken Adams discovered *Potamogeton polygonifolius* in a bog in Epping Forest. This pondweed has always been rare near London, and the bogs of the Forest are few and quite well studied, so it is remarkable that the plant has not been seen there before in recent times. Dr Adams has also reviewed all Essex localities of the invasive alien waterweeds *Crassula helmsii* and *Myriophyllum aquaticum.* The latter is in three places within our circle. His review also included *Hydrocotyle ranunculoides* which has spread dramatically since it was first seen by the Chelmer in 1990; this has yet to reach the London Area.

V.C. 20, Herts.

I believe the site of a former sewage works near Friern Barnet may be in the Watsonian vice-county of Herts., though it is now in the London Borough of Barnet; in this area the pre-LCC county boundaries are not easily traced. David Bevan told me of a colony of *Ophrys apifera* and a patch of the rare sedge hybrid *Carex acuta* × *acutiformis* = *C.* × *subgracilis*, first found by G. Hounsome on this site, and near the orchid in rough grass Mr Bevan photographed *Trifolium striatum.*

After the large selection of records out of the Hertfordshire Flora Survey reproduced here last year, there seems little to report. A. J. Showler and Tim Rich compiled a list of all British localities for coral-root *Cardamine bulbifera*, from which it emerged that there are two Herts tetrads shown as having it in *Flora of the London Area* (Burton 1983: 22) where it cannot now be found. Investigation of the plant mapping scheme records showed that in both it was recorded by Peter Ellison in 1966. Happily Mr Ellison is still with us and could identify one of the two localities at least as a piece of woodland now covered by the M25 motorway. In 1991 he found pickerel-weed *Pontederia cordata* in a pond on the east side of Chorleywood Common and small quantities of *Trifolium striatum* and cypress spurge *Euphorbia cyparissias* on Juniper Hill south of Rickmansworth. Mr E. C. Ormerod reported a single plant of the alien *Lappula squarrosa* in his own garden at Bushy Heath, with the interesting comment 'I think the seed must have been brought in by a migrating starling earlier this year, judging by the position in which it was growing'. Dick and Joan Walker told me about a colony of another alien, *Potentilla norvegica*, at the edge of an area of rough standing for anglers' cars at Aldenham Reservoir. First found in 1990, it was still there in 1991 in spite of pressure from encroaching vegetation and from cars, whose presence made the colony difficult to survey.

V.C. 21, Middlesex

This vice-county includes most of the densely built-up centre of London, not a good habitat for plants, but relatively well supplied with people who might notice them. Members who have had the good fortune to retire to the country usually have to come into the centre when they visit London, and this no doubt explains how Richard Fitter came to find the exotic fern *Pteris cretica* on a basement wall in Balcombe Street, Marylebone. More recently used to street botany, Mr Mullin found four plants of the rare oak-leaved goosefoot *Chenopodium glaucum* outside a doctor's surgery in North End Road. More central than either of these must be Legh St., WC2, the address as given by Mr Kitchener where he found nettle-leaved goosefoot *C. murale* and fruiting *Solanum capsicastrum.* Mr Palmer tells me that seedlings of the latter common window-box subject are quite frequent in the streets of Belgravia. Less central, but still decidedly urban, is the rough grass patch at South Tottenham where *Erodium moschatum* was found, as at Peckham, by Mr Wurzell. In the same area he saw a colony of Good King Henry *Chenopodium bonus-henricus* in rough grass, a vigorous patch of the tall garden scabious *Cephalaria elata*, and in the grounds of St Ann's Hospital ample regeneration of the service-tree *Sorbus domestica.* These finds and that of a large colony of yellow vetchling *Lathyrus aphaca* on Tottenham Marsh were communicated to me by David Bevan, who in the latter locality himself made the even more remarkable discovery of a single plant of yellow bartsia *Parentucellia viscosa.*

Mr Bevan also told me of a single plant of *Ophrys apifera* found by Roy Beddard in rough grass near Brent Reservoir. I have no way of knowing whether this is one of the two in the same locality found by William Griffin, as reported to me by Leslie Williams. Mr Williams sent me a specimen of a dock from a pumped mud-pit in the same area which I was able to identify as *Rumex maritimus.* In Fryent Country Park he saw scattered plants of *Agrostemma githago* on disturbed dry mounds and in hay meadows. His doubts about the origin of these can surely be resolved by reference to the same species both in Kent as already mentioned, and in quantity on fresh soil at Mote End Farm, Mill Hill together with *Centaurea cyanus, Chrysanthemum segetum* and corn poppy *Papaver rhoeas.* These were reported by Anthony Vaughan, as well as fruiting *Callitriche platycarpa* in a field pond in the same area, wall lettuce *Mycelis muralis* in two places at Highwood Hill, *Hypericum pulchrum* in a tiny fragment of old woodland near East Finchley L.T. station damaged by the storm of October 1987, and much else.

We are dependent on the skill of experts from outside London for the identification of brambles. Elizabeth Norman had seven species from Holland Park named for her by Alan Newton, and a more remarkable discovery, confirmed by Dr Newton, was made by Dr David Allen on a visit. In two places on Hampstead Heath he found *Rubus curvispinosus*, otherwise known only from Wessex, mainly around Bournemouth, and on a common in Gloucestershire. Other noteworthy Middlesex records are the storksbill *Erodium cicutarium* which Mr Latham found in the grounds of the West Middlesex Hospital at Isleworth and the bladderwort *Utricularia australis*, a flower of which Ann Rix showed me, taken for identification from the Park Road pond reserve of the London Wildlife Trust at Uxbridge.

The part of v.c. 21 which is now in Surrey had a passing visit from the Kent naturalist John Badmin in early April 1991. He found *Lamium hybridum* by a path at Upper Halliford Green, and on the Thames shore west of Sunbury Lock the alien crucifer *Diplotaxis erucoides*, of which we have very few records, none recent. The identification of this was confirmed for me by Tim Rich.

V.C. 24, Bucks.

Just in Bucks., by the Slough arm of the Grand Union Canal, Carol Hawkins found a group of 14 plants of an *Amsinckia.* The determination of these aliens from America is difficult, but this is certainly the same species as the one naturalised in Suffolk, which is thought to be *A. intermedia.* It is abundant in the car park at the RSPB's reserve at Minsmere, and I would hazard that it was accidentally introduced to the canal path on a birdwatcher's socks.

Criteria for Submission of Records

It is always worth repeating that only a selection of the records received actually gets published. A year ago in these pages I dealt very fully with the criteria by which the records for publication are selected. However even those records which are not published are for the most part retained in a card index, and it should be useful to members to know what records are worth submitting, even if they are not likely to be published.

As there are several hundred species of vascular plants occurring in the London Area, relatively few of which are very common, it is easier to specify those whose every occurrence is ***not*** worth recording. Even for these, unusual variations, fluctuations in numbers from year to year, differences in first flowering according to the weather and so on may merit reporting.

The species listed in Table 1 are common throughout the area. In the case of those species, it is their absence from a particular part of the area rather than their presence in it which would be worthy of note. Also the species in Table 2 are common in large parts of the area, though all have significant gaps which are worth noting in detail. In particular *Epilobium montanum* is rare in the Essex portion and perhaps the Herts. portion too, *Festuca pratensis* is decidedly local in much of the Kent and Essex portions, *Galium verum* is local in Kent, *Linaria vulgaris* and *Rumex acetosella* are local in North Essex and *Solidago canadensis* is (or was?) rare in the Herts. and North Essex portions of our area.

It would certainly be useful if it were possible to define in some fairly precise way the area in which a large number of species together were too common to record singly. In our area the most obvious division is between town and country. Gilbert (1989: 16-18) explains clearly the reasons why certain species should be common on the rural fringes of our area and absent from the urban centre and gives as illustrations the maps of *Arum maculatum* and *Mercurialis perennis* in *Flora of the London area* (Burton 1983). The problem of definition in this case is the delimitation of 'the centre' in which any occurrence of them is sufficiently remarkable to record. The method by which I propose to make this definition is to consider the distribution in the area of all appropriate species

TABLE 1. Species of common occurrence throughout the London Area.

Acer pseudoplatanus
Achillea millefolium
Aegopodium podagraria
Aethusa cynapium
Agrostis stolonifera
Alopecurus pratensis
Anagallis arvensis
Anisantha sterilis
Arctium minus
Armoracia rusticana
Artemisia vulgaris
Aster novi-belgii agg.
Atriplex hastata
Atriplex patula
Ballota nigra
Betula pendula
Bromus mollis
Calystegia sylvatica
Cardamine hirsuta
Cerastium holosteoides
Chenopodium album
Convolvulus arvensis
Crataegus monogyna
Crepis capillaris
Crepis vesicaria
Cymbalaria muralis
Cynosurus cristatus
Dactylis glomerata
Dryopteris filix-mas
Epilobium adenocaulon
Epilobium hirsutum
Equisetum arvense
Euphorbia helioscopia
Festuca rubra
Fraxinus excelsior
Galium aparine
Geranium dissectum
Geranium molle
Hedera helix
Heracleum sphondylium
Holcus lanatus
Hordeum murinum
Hypochaeris radicata
Ilex aquifolium
Lamium album
Lamium purpureum
Lapsana communis
Leontodon autumnalis
Lolium perenne
Lotus corniculatus
Malus sylvestris s.lat.
Malva sylvestris
Matricaria recutita
Medicago lupulina
Papaver rhoeas
Phleum pratense
Plantago lanceolata
Plantago major
Poa annua
Poa pratensis
Poa trivialis
Polygonum aviculare
Polygonum convolvulus
Polygonum cuspidatum
Polygonum persicaria
Prunella vulgaris
Pteridium aquilinum
Ranunculus acris
Ranunculus bulbosus
Ranunculus repens
Rubus 'fruticosus'
Rumex acetosa
Rumex crispus
Rumex obtusifolius
Sagina procumbens
Salix caprea
Salix cinerea agg.
Senecio squalidus
Senecio vulgaris
Silene alba
Sinapis arvensis
Sisymbrium officinale
Solanum dulcamara
Solanum nigrum
Sonchus arvensis
Sonchus asper
Sonchus oleraceus
Stellaria media
Taraxacum officinale agg.
Tragopogon pratensis
Trifolium dubium
Trifolium pratense
Trifolium repens
Tripleurospermum maritimum
Tussilago farfara
Urtica dioica
Veronica persica
Vicia sativa s.lat.

TABLE 2. Species of common occurrence in most parts of the London Area.

Agrostis gigantea
Agrostis tenuis
Chrysanthemum parthenium
Circaea lutetiana
Clematis vitalba
Conyza canadensis
Dipsacus fullonum
Epilobium montanum
Festuca pratensis
Galium verum
Humulus lupulus
Lactuca serriola
Lemna minor
Linaria vulgaris
Lolium multiflorum
Polygonum lapathifolium
Rumex acetosella
Solidago canadensis
Trifolium hybridum
Ulex europaeus

and the extent to which their distributions coincide. The principal data available for this purpose are the maps in *Flora of the London area*. These have some obvious deficiencies, but the means of making good do not generally exist. However it has been possible to use as supplementary sources the maps in *Flora of Croydon* (Byatt 1985), the records from 111 localities in London boroughs in v.c. 18 shown on a map in Plant *et al.* (1985: 28) and scattered observations by Ann Boucher in the Hoddesdon area of Herts., Barry Phillips in the Chertsey area of Surrey, myself mostly in Kent and a few others. The names for the species used in all tables are those in Burton (1983).

The species listed in Table 3 are in varying degrees generally distributed in the rural areas around the fringe of our circle, and absent from the densely built-up area in the centre. Figure 1 shows how many of these species are absent from each of the tetrads in our recording circle. A line encloses all scores of 27 or more, and scores of 18 or more are shown in heavier type. From the map, it can be seen that the continuously built-up centre of London must be regarded as extending west to Turnham Green, south to Wandsworth, Streatham and Lee, north to Cricklewood, Tufnell Park, Newbury Park and Becontree, with a long extension north to Enfield, and east all the way to Rainham. Not all the outlying areas enclosed by a line on the map make good sense, but it does seem reasonable to assume that the tetrads containing Norwood Junction, Watford, Colney Street to St Albans, Brentwood and the neighbourhood of the Thames at the eastern margin of our area are genuinely deficient in 'rural' species. For the purpose of maintenance of the Society's plant records, details of the species in the last list are only required if they occur in or near the areas enclosed by that line, though of course there is always room for the exercise of discretion. *Fagus sylvatica* has a similar map to Figure 1, but the extent to which it occurs possibly naturally in woods varies greatly and statements of the local situation everywhere are useful.

Five species, *Buddleia davidii, Galinsoga ciliata, G. parviflora, Mercurialis annua* and *Urtica urens*, are commonest in the centre of the area and their distributions show some negative correlation with the sum of the 45 listed above. The implication is that they are not worth recording within the line in the centre of Figure 1.

Interpreting Figure 1 from a different point of view, it can be seen that there

TABLE 3. Species of common occurrence only in the outer parts of the London Area.

Acer campestre
Agrimonia eupatoria
Alliaria petiolata
Anthoxanthum odoratum
Arum maculatum
Barbarea vulgaris
Brachypodium sylvaticum
Bryonia dioica
Calystegia sepium s.str.
Cardamine pratensis
Centaurea nigra agg.
Chaerophyllum temulentum
Corylus avellana
Deschampsia cespitosa
Galium mollugo
Geranium robertianum
Geum urbanum
Glechoma hederacea
Hieracium pilosella
Hypericum perforatum
Lathyrus pratensis
Luzula campestris
Phleum bertolonii
Potentilla anserina
Prunus spinosa
Quercus robur
Ranunculus ficaria
Rosa arvensis
Rosa canina
Rumex sanguineus
Senecio jacobaea
Silene dioica
Stachys sylvatica
Stellaria graminea
Stellaria holostea
Tamus communis
Thelycrania sanguinea
Torilis japonica
Ulmus procera
Veronica chamaedrys
Veronica hederifolia
Vicia cracca
Vicia sepium

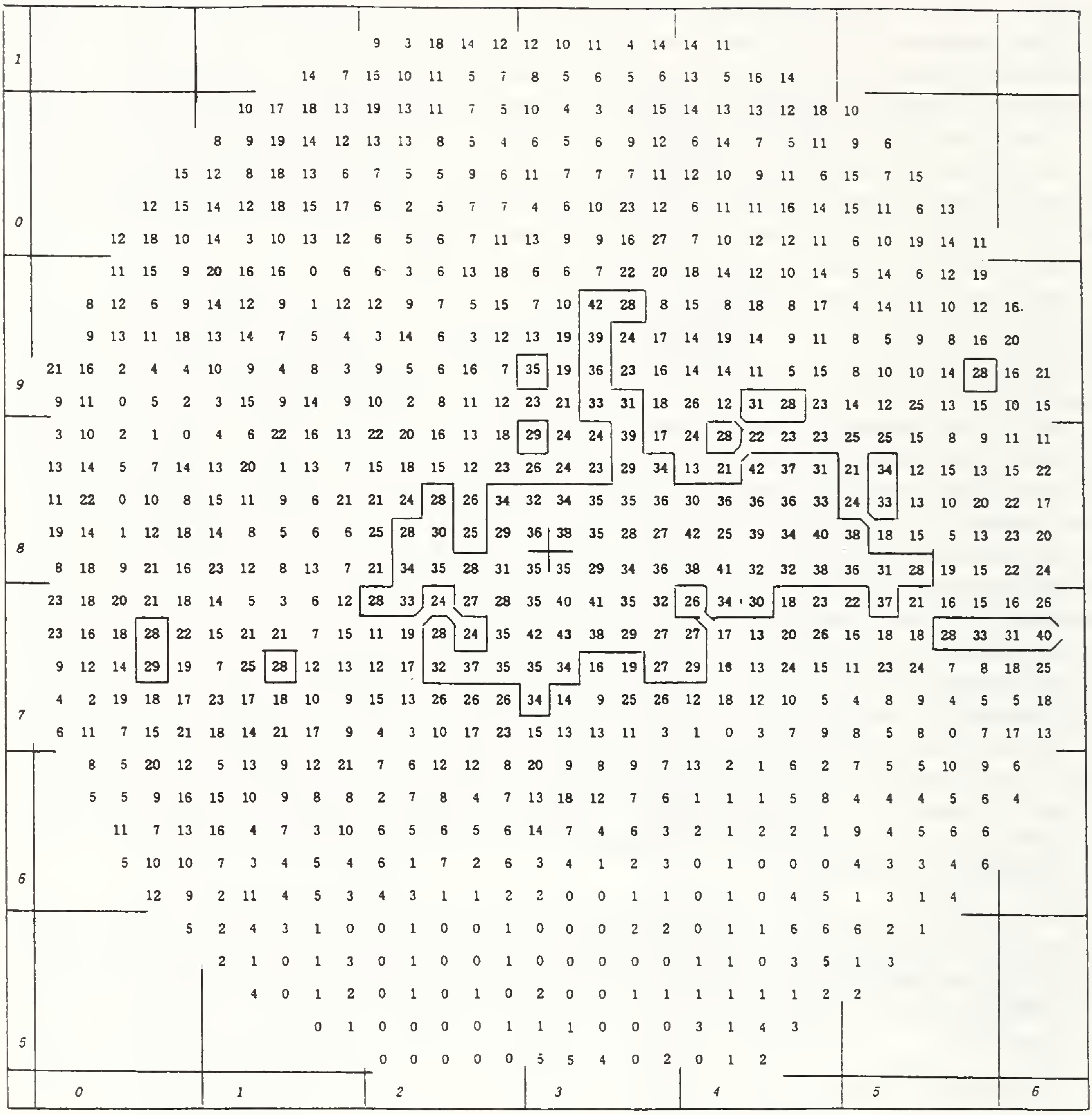

FIG. 1. Total absences from each tetrad of 45 species listed in Table 3. Lines enclose derived boundaries of densely built-up areas.

are some areas with low scores compared to their surroundings. These can be interpreted as being important reservoirs of 'rural' species. They can be identified as Hampstead Heath, Leyton Flats, Wanstead Flats and Park, the neighbourhood of Chiswick and Barnes, Dulwich Woods and surrounding open areas and the Shooters Hill area including Oxleas Wood.

Another habitat distinction which can be read off our species maps is that between wooded and unwooded land. Our woodland is diverse and few species are characteristic of all types. Another difficulty is that woods can be quite small, but their effect in distribution maps with a unit of 2,000 × 2,000 metres is to reduce the significance of the unwooded ground in between. However, the 29 species of Table 4 have in common an apparently continuous occurrence in the more densely wooded ground above and below the chalk outcrop south of London and a good scattering of tetrad records in other parts of the area. Superimposing their maps might reveal which sites outside the main area mentioned can be regarded as having all the common woodland species, which would not then need to be recorded separately from each of those sites.

Figure 2 shows how many of those 29 species are present in each of the tetrads in our recording circle. A line encloses scores of 26 or more, and scores of 20

TABLE 4. Common species of well-wooded parts of the London Area.

Ajuga reptans
Anemone nemorosa
Carex sylvatica
Cirsium palustre
Conopodium majus
Digitalis purpurea
Dryopteris dilatata
Endymion nonscriptus
Festuca gigantea
Fragaria vesca
Galeobdolon luteum
Holcus mollis
Lonicera periclymenum
Lysimachia nemorum
Melica uniflora
Mercurialis perennis
Moehringia trinervia
Myosotis arvensis
Oxalis acetosella
Poa nemoralis
Primula vulgaris
Prunus avium
Scrophularia nodosa
Sorbus aucuparia
Teucrium scorodonia
Veronica montana
Veronica serpyllifolia
Viola riviniana
Zerna ramosa

or more are shown in heavier type. The 'continuous' wooded area south of London is seen to extend from our boundary at Mickleham to Fawkham Green, and north to Epsom, Banstead, Farleigh, Hayes, Petts Wood, Joydens Wood and Darenth Wood. Outlying well-wooded sites are in a band from Ridgehill to Wormley Wood, especially Northaw Great Wood, Ruislip Woods, Sherrards-

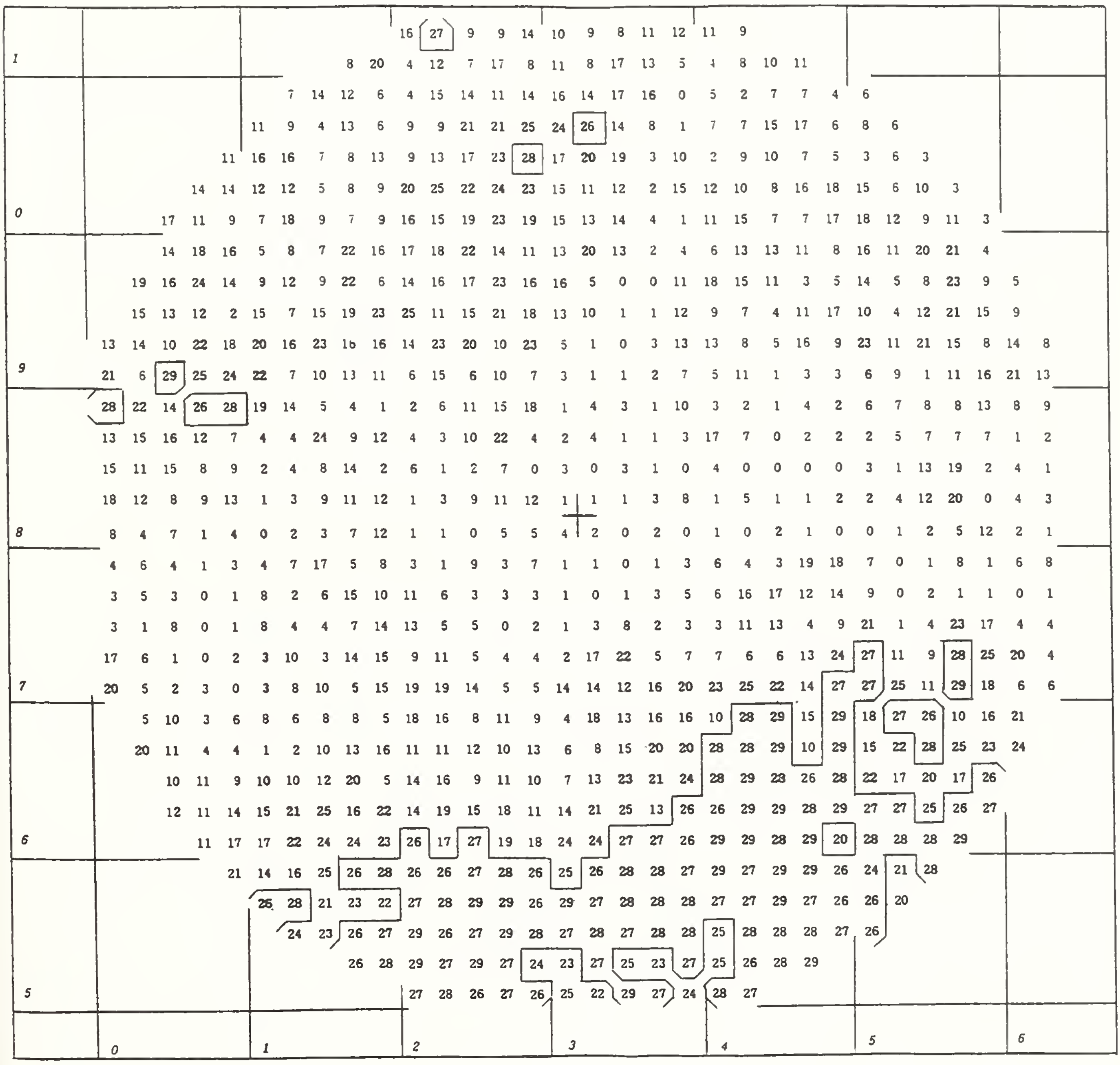

FIG. 2. Total presences in each tetrad of 29 species listed in Table 4. Lines enclose derived boundaries of well-wooded areas.

park Wood, at South Harefield and to a lesser degree at Harrow-on-the-Hill, Hampstead Heath, Dulwich Woods, between Cranham and Aveley, Thorndon Park and Wanstead Park. Within the main area south of London there are poorly wooded inliers around Halstead, from Orpington to Sidcup, at Crockenhill and Swanley, at South Darenth and Horton Kirby, at Sutton-at-Hone and even in the tetrad including the northern part of The National Trust's Selsdon Wood. A large area of central and east London is almost completely without these common woodland plants.

The last criterion to be considered is geological. The compilers of the LNHS *Handlist* (Kent and Lousley 1951-7) made several references to species being 'common on the chalk' in v.c. 16 and 17, species for which lists of localities in other vice-counties in the area were supplied. In those vice-counties the chalk outcrops are very much more scattered and less continuous, so that records of chalk-loving plants are likely to be worth making individually. Although the characteristic vegetation of chalk outcrops is usually considered to be grassland, there are also field and woodland plants which show a similar distribution within the London Area. The 39 species in Table 5 are of general occurrence in a band of country across the Kent and Surrey portions of our area. Figure 3 shows how many of these species are present in each tetrad in the south and south-east of our recording area. A line encloses scores of 30 or more, and scores of 25 or more are shown in heavier type. It is not practical to draw a negative correlation with the distribution of common species known to be calcifuge, such as *Equisetum arvense*, because most of the tetrads enclosed by the line are not vegetated entirely by communities of calcicole species, but also include non-calcareous areas. From Figure 3 it is evident that the main chalk outcrop in our area extends from Fetcham and Reigate Hill in Surrey to Farningham and West Kingsdown in Kent, with a northern boundary passing Ashtead, Belmont, Woodmansterne, Farleigh and Farnborough and a southern boundary along the line of the escarpment. Between these boundaries there are smaller areas around Chelsham, Knockholt and Halstead where the continuous occurrence of more recent geological deposits make the chalk flora rarer. In Kent there are also detached chalky areas around Longfield and Swanscombe Park. This map should make it easier for members to decide where at least those species listed are not worth recording individually wherever they occur.

TABLE 5. Common species of the chalk in the south and south-east of the London Area.

Adoxa moschatellina
Briza media
Carduus 'crispus'
Carex flacca
Centaurea scabiosa
Chaenorrhinum minus
Cirsium acaule
Clinopodium vulgare
Daucus carota
Euonymus europaeus
Fumaria officinalis
Helianthemum chamaecistus
Hypericum hirsutum
Inula conyza
Knautia arvensis
Leontodon hispidus
Ligustrum vulgare
Linum catharticum
Mycelis muralis
Odontites verna
Origanum vulgare
Pastinaca sativa
Pimpinella saxifraga
Plantago media
Polygala vulgaris
Potentilla sterilis
Poterium sanguisorba
Reseda lutea
Rhamnus cathartica
Sanicula europaea
Scabiosa columbaria
Senecio erucifolius
Silene vulgaris
Sorbus aria
Taxus baccata
Viburnum lantana
Viola hirta
Viola reichenbachiana
Zerna erecta

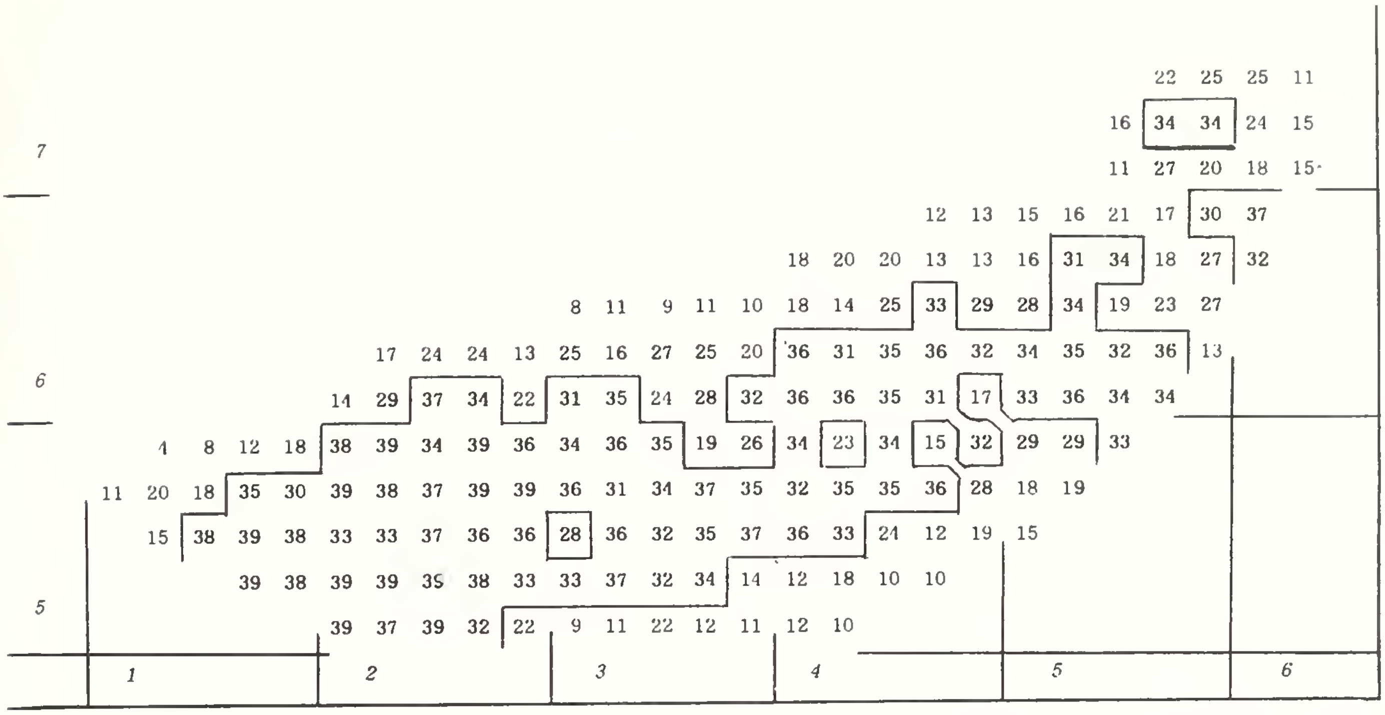

FIG. 3. Total presences in each tetrad (in the south and south-east of the LNHS recording area only) of 39 species listed in Table 5. Lines enclose derived boundaries of the main chalk outcrop in the area.

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Book Review

The Robin. By Mike Read, Martin King and Jake Allsop. Blandford Press, London. 128 pp. £16.99. ISBN 0-7137-2156-1.

This beautifully produced book is built round a series of photographs of robins taken by Mike Read and Martin King. The first chapter describes the robin and its distribution, the next six cover its annual cycle and the last three discuss migration, robins and people, and photographing robins.

Apart from a surprising error at the beginning where there are said to be just two orders of birds, the book is informative and provides a good introduction to the species. The authors often draw on their own observations and also refer to other peoples' studies and BTO surveys. It is however the superb photographs which are the main attraction of the book. Many show the bird in action. I was particularly fascinated by the robin scratching its face; an action which in life is done in a flash.

I would recommend this book to anyone who has a liking for robins and wants to know more about them.

HELEN BAKER

Book Reviews

Weevils. By M. G. Morris. Naturalists' Handbooks 16. Richmond Publishing Co. Ltd., Slough. 1991. 76 pp. £13 hardback, £7.95 paperback. ISBN 0 85546 282 5 (hbk), 0 85546 281 7 (pbk).

This title follows in the tradition of the series, each being intended to introduce the basic biological aspects and describe some details of a specific area of wildlife. It is written in a clear and pleasing style by a recognised expert who sympathetically conveys us along an interesting 'nature trail': in this instance, contemplation of weevils and their adaptation to the environment.

The main chapters deal with the biology, identification, and practical techniques for collecting and studying weevils. Though, naturally, attention has been concentrated upon the more familiar species, there is a tendency to exclude or give only brief details of those rarer, and often more spectacular, species (e.g. *Platyrhinus resinosus*, allocated one colour reproduction, but no mention in the text) which are also of interest. As the format chosen leaves 25% on the left side of each page blank, it is disappointing to find that the author has limited the text, mentioning in several places that 'lack of space' has prohibited the inclusion of further detail!

The classification adopted in the biology and identification chapters has been based upon foodplants rather than morphology. Though this has practical advantages for field study it does mean that the keys, which correspond to only seven plant species, present a very incomplete coverage of British species. The 'lack of space' would, however, make this inevitable in a publication of this size.

The black-and-white figures and drawings are excellent, the only regret is that there are so few of them. Illustration of more species would have been appreciated: as it is, six of the 15 figures included (*Cionus alauda:* figs 6 & 11, *Cleopus pulchellus:* figs 7 & 8, and *Byctiscus betulae:* figs 12 & III2) are duplicates. By contrast the quality of the colour plates is poor: they lack good definition, have inaccurate coloration and depict many of the beetles in a quite unnatural attitude with middle legs extended laterally at 90 degrees to the body.

In conclusion, though the author is to be congratulated for writing a text full of interesting information the format is wasteful of space which could have been used to advantage.

IAN MENZIES

Birds of Breconshire. By Martin Peers and Michael Shrubb. Brecknock Wildlife Trust, Brecon. 1990. 62 pp. £4 (£4.50 by post from the Trust at Lion House, Lion Yard, Brecon, Powys LD3 7AY). No ISBN.

I must admit that the name Shrubb still summons Sussex, not Breconshire, to my mind. For the likely reader of this review the contrast is perhaps of some interest. The 1988-90 *Breeding Atlas* shows a probable 13 pairs of merlins, six pairs of red kites, red grouse now a scarce breeding resident and, more sadly, the demise of the black grouse. Perhaps the most contrasting figures from the south-east of England are again from the *Breeding Atlas:* these are that dippers were present in 27 per cent and ravens in 49 per cent of the tetrads surveyed.

The publication is the size of a normal county bird report, but is aimed at updating the systematic list since 1974, although the records for the 20 years to 1990 have normally been included. There have been only occasional local bird reports and thus the need for a systematic list.

Not surprisingly, the names Llangorse Lake and Talybont Reservoir feature prominently with the majority of sightings and peak numbers of the ducks and waders, etc. There is a brief discussion of land use and habitat change. Interestingly, the local tree sparrows appear to be holding their own. So, for any visitor to the area this publication would be a worthwhile addition, although not a site-by-site guide. The aim is to provide a coherent and useful list for Breconshire and in this task the authors have succeeded admirably.

H. M. V. WILSDON

Obituaries

CYNTHIA EVELYN LONGFIELD, F.R.G.S., F.R.E.S., M.B.O.U., 1896-1991

With the death of Cynthia Longfield in Cloyne, County Cork on the 27 June 1991 the London Natural History Society has lost its senior Honorary Vice-President and the world of entomology a leading authority on the study of dragonflies.

Cynthia Longfield was born at her parents' London home in Pont Street, Belgravia on the 16 August 1896. She was the youngest of three daughters of Montifort Longfield of Castle Mary, Cloyne and his wife Alice (née Mason) who lived in London. Her first interest in natural history could be said to have been on an occasion when, during a family portrait session in London as a very small child, she took hold of a butterfly-net in the artist's studio following her father's suggestion that she should be holding something to improve the composition of the picture. At the age of 14 Cynthia rebelled against formal school teaching and told her mother in no uncertain way that she wanted to learn science. Her mother favoured Cynthia's interest and provided books for her, but she also insisted that Cynthia should acquire the same feminine skills as her elder sisters. Cynthia's scientific reading began with children's natural history books, but she quickly moved on to adult reading by authors such as Gosse, Lyell and Huxley. She also became interested in fieldwork.

However, when the First World War started in 1914, Cynthia's lifestyle changed abruptly. She was due to have a 'coming out' dance and then indulge in society, but that was abruptly halted. She had already learnt to drive her father's car at Castle Mary and armed with that skill she joined the then Army Service Corps in London. During the war skills were learnt quickly and as more men became drivers her post was taken over, so she went to an aircraft factory in the Fulham Road where she was put in charge of the glue pot. Later she graduated to carpentry and developed her skills of shaping the many pieces of wood needed in the formation of the wings and fuselages of the aeroplanes. The man opposite her was a first-class cabinet maker in peacetime. When the war ended in 1918 Cynthia remained with her parents in Pont Street, but now the Irish Troubles had started and in May 1920 Castle Mary was attacked and burnt down.

Cynthia's first real voyage of discovery started in December 1921 when she was 25. She and her cousin Rhona had been invited by friends of the family to join them on a voyage to South America. This was the chance she had been waiting for. She thrilled in seeing tropical birds, butterflies, dragonflies and mammals and had glimpses of South American life and customs. They crossed the Andes by train and she sampled the marine life of the Pacific coast, and later, like many naturalists after her, she crossed Lake Titicaca. Eventually they crossed via the Panama Canal to the Atlantic coast and reached Liverpool on the 29 March 1922. During that trip the seeds had been sown in Cynthia's mind that were to lead to her embarking on more expeditions. In January 1923 Cynthia, her sister Norah and their mother set sail for Egypt. During their travels they were fortunate to stay at the same hotel as Howard Carter and Lord Carnarvon. Cynthia had learnt sufficient archaeology to impress, but she derived far more interest from the living surroundings. As she matured more the only other interest that occupied her was the Girl Guides of which she eventually became Captain of the 12th Chelsea Company. Guide activities, especially camping, stood her in good stead for future expeditions abroad.

One day in 1923 Cynthia saw an advertisement from Evelyn Cheeseman at London Zoo for a female companion to accompany her on an expedition on the scientific research vessel *St George* to the Pacific. The *St George* left Dartmouth on the 9 April 1924 with 57 people on board. Cynthia was to be assistant to Cyril Collenette (1888-1959) who was already established as a successful entomologist (he had joined the LNHS in 1907 and in 1931 became an Honorary Associate of the British Museum (Natural History)) and they were to collect and study Coleoptera and Lepidoptera. Evelyn Cheeseman was to study the mosquitoes. Other research members of the crew comprised a marine biologist, an ornithologist, a botanist, a geologist, an archaeologist and a film

Cynthia Evelyn Longfield, 1896–1991.

crew. They crossed the Atlantic to Panama, traversed the Canal, visited Colombia, the Galapagos, many of the island groups in the Pacific and returned to Panama where Cynthia left the *St George* and returned to England in the late summer of 1925 on a cargo boat – 'I went on the *St George* Expedition to follow Darwin's footsteps, and I got there'.

Cynthia's collections came to the Entomology Department at the BM and soon she started working in an honorary capacity on her material under the direction of D. E. Kimmins (1905-1985), whose speciality was the 'neuropteroids' (especially Trichoptera, Neuroptera and Odonata). Cynthia continued to work voluntarily in the Museum until her retirement in 1957. She was appointed an Honorary Associate in 1948.

Cynthia's next expedition was to the Mato Grosso in Brazil where she and her friend Gwen Dorrien-Smith accompanied Cyril Collenette from March until September 1927, when the two ladies returned to England. Collenette returned at Christmas.

In 1926 Cynthia joined the LNHS and it was not long before she had established herself as a leading member of the Society, attending many field and indoor meetings. She was elected President for 1932 and 1933 and a Vice-President from 1934 until her retirement from London in 1957, when she was made an Honorary Vice-President. She was always involved in Sectional activities, being Chairman of the Ornithology Section in 1935 and again in 1945 and 1946, Chairman of the Entomology Section from 1945-50, and Chairman of the Nature Conservation Committee from its formation in 1949 until its incorporation into the Ecology Section in 1957.

Richard Fitter remembers her being very kind to him when, as tyro Secretary of the Ornithology Section in 1935, he forgot the minute book for his first committee meeting. The writer recalls the tea and fruit-cake that were always on the agenda at her flat during the meetings of the Nature Conservation Committee. Under her chairmanship of the Entomology Section she encouraged members of that Section to take up the study of various groups of insects in the London Area. This resulted in E. R. Nye working on the mosquitoes, D. G. Hall on the beetles, particularly the ladybirds, and E. W. Groves on the bugs, Hemiptera–Heteroptera. For several years until her departure for Ireland, Cynthia was a member of the Committee on Bird Sanctuaries in the Royal Parks, to which many of our members contributed their observations which were published in the sometimes annual, sometimes biennial *Bird Life in the Royal Parks* (HMSO/DOE). She was also a Council member and Vice-President of the Royal Entomological Society of London.

However, despite a very active involvement in our Society, Cynthia continued to travel. Towards the end of 1929 she visited South-east Asia for six months and returned with a valuable collection of Lepidoptera and Odonata. During her Presidency of the LNHS she visited Canada briefly and on her return lectured to the Society on the Rockies. In early January 1934 she left for a six-month trip to Africa where she travelled and collected widely in the eastern and southern parts of the continent.

After the last expedition Cynthia concentrated on two areas of research at the BM, her African collections and the study of British Odonata which culminated in the publication of *The Dragonflies of the British Isles* (Warne 1937). In this book she took the then bold step of assigning to each group and species a popular name in the hope that 'should these be accepted, dragonflies will arouse more interest than they do at present'. Soon she was planning another journey to Africa, again to the southern and eastern parts, but largely on different routes. In between these expeditions she managed to attend a number of overseas entomological and ornithological congresses.

When Cynthia returned to England in February 1938, Europe was in a crisis and the Second World War was on the horizon. In London men and women were being enlisted into the Auxiliary Fire Service and on the 28 March 1938 Cynthia was one of the first to join. She was soon driving senior fire officers around in requisitioned taxis. At the first training exercise she helped the future Home Secretary, Herbert Morrison, on with his fire boots. During an intense eight-hour raid on London on the 16 April 1941 Cynthia was control officer at Brompton Fire Station when a substation at Chelsea received a direct hit. Later on the same night a bomb fell in Chelsea Square opposite Cynthia's station, blocking the entrance with debris and burying eight firemen. During the early days of the war much of the Natural History Museum's collections, especially type material, was evacuated to country houses, and even caves, away from London. The Museum suffered considerable damage and when a bomb fell on the Botany Department, Cynthia was instrumental in seeing that a turntable ladder was used to fight the fire raging in the east wing. Cyril Collenette wrote that 'her prompt action probably saved the Museum from destruction'.

After the war Cynthia renewed her entomological activities in earnest. By 1945 *The Dragonflies of the British Isles* was out of print, so she worked on an enlarged, revised edition with new plates. This was published in 1949 and was even more successful than its predecessor. International congresses again began to be held and Cynthia participated in numbers of them, including after her retirement to Ireland. In 1949 she wrote on 'The Dragonflies (Odonata) of the London Area' (*Lond. Nat.* **28**). Her last important work on British dragonflies was the New Naturalist volume *Dragonflies* (Collins 1960) which she co-authored with P. S. Corbet and N. W. Moore, whilst she also provided most of the records for the first two editions (1977, 1978) of the 'Provisional Atlas of Dragonflies in Ireland' (Irish Biological Records Centre, Dublin). The British Dragonfly Society was formed in 1983 and it was not long before Cynthia was elected its first Honorary Member. At about this time she donated many Odonata specimens to the National Museum of Ireland and her books to the Royal Irish Academy. She had been a Life Member of the Botanical Society of the British Isles since 1932, and in 1963 she had been instrumental in the formation of a single BSBI branch for the whole of Ireland. She had also, following her retirement to Ireland, been active in the Cork Ornithological Society and involved in many Irish conservation projects.

Her great-niece, Jane Hayter-Hames, has recently written an illuminating, in-depth biography of her under the title *Madam Dragonfly – The Life and Times of Cynthia Longfield* (Pentland Press 1991), to which the writer of this tribute would like to record his acknowledgement for certain details. An account of her contributions to the taxonomy of world Odonata is given by R. M. Gambles in his article 'To Miss C. E. Longfield, F.R.E.S.' in *Odonatologica* **4:** 55-59 (1975), whilst certain of her dragonfly publications omitted from *Madam Dragonfly* are listed in the *Journal of the British Dragonfly Society* **5:** 47 (1991).

Although most of us in the Society were not privileged to meet Cynthia Longfield after her retirement to Ireland, her concern for the LNHS was maintained and she corresponded with Council and her former colleagues on occasion.

K. H. Hyatt

DONALD FRANCIS BOWMAN, B.A., 1924-1991

It came as a great shock to the Society when we learned of the death of Don Bowman in June 1991, shortly after his return from a holiday in Poland with his wife Eileen. Don had been a member of the Society since 1967. He was Field Meeting Secretary of the Ornithology Section for some seven years and then its Chairman for a further four years. He had also been an active member of the Ruislip and District Natural History Society and became its Treasurer in 1987. Don travelled widely in search of birds and visited most European countries and also north Africa.

Don was born and went to school in Hendon in north London and at the age of eighteen he joined the Royal Air Force. During his five years with the RAF he was a radar mechanic servicing Lancaster bombers, firstly in Lincolnshire, but subsequently in Singapore. On leaving the RAF Don attended the North Western Polytechnic where he obtained his B.A. He then went on to work for the General Electric Company at their North Wembley plant, but was later to transfer to Stanmore where he worked for Marconi Defence Systems, a section of GEC, until his retirement in 1988.

Don married Eileen Gooding, also an active member of this Society, in March 1982, and they travelled a great deal, not only for birds, but also for flowers of which they both had a great love. On Don's retirement they moved to Wimborne in Dorset and both became actively involved in the Dorset Bird Club, of which Don had been a member since 1986, and was to become its Membership Secretary in early 1990. By then he had also joined the Dorset Trust for Nature Conservation and was a founder member of its Wimborne Group, acting as Treasurer until his untimely death.

The news of Don's death was even more of a shock to members of the Ornithology Section, as he and Eileen had joined up with the Section's coach outing to the New Forest one Sunday in early June 1991 and spent the whole day with the group. He was to enter hospital a few days later for an operation, but sadly passed away two weeks after the operation when complications set in.

Don was a quiet and unassuming man who had the respect of all members of the Ornithology Section as being a first-rate birder with a vast amount of knowledge which he was always willing to share with others. His death came as a great shock not only to his many friends in the LNHS, but also to those in the Dorset Bird Club and the Dorset Trust for Nature Conservation. He left a legacy of £5,000 to the LNHS.

Eileen has taken over Don's post of Membership Secretary of the Dorset Bird Club in addition to the post of Publicity Officer which she already held. We extend our condolences to her on her great loss.

ROGER HARBIRD

London Natural History Society Income and Expenditure Account for the year ended 30 June 1991

1990 £	Income	£	£	£
	Income from members and supporters:			
9,278	Subscriptions		9,167	
403	Donations		477	
811	Tax recovered on covenanted subscriptions		813	
10,492				10,457
814	**Sales:** Journals	1,096		
(74)	*Less:* Expenses	(266)		
			830	
45	Literature & surplus library stock		44	
6	Journal offprints		23	
123	*Flora of the London Area*	307		
(10)	*Less:* Expenses	(53)		
			254	
288	*Butterflies of the London Area*	198		
—	*Less:* Expenses	(52)		
			146	
—	Chipperfield Bequest		413	
1,192				1,710
	Income from investments and deposits:			
14,063	Stocks and shares		15,283	
3,700	Tax recoverable 1990-1	3,941		
829	1991-2	815		
			4,756	
649	Investment cash account		562	
6,766	Profit on sale of investments		571	
			21,172	
(3,194)	*Less:* Custodian's charges	(3,544)		
(21)	Overseas charges	(244)		
			(3,788)	
			17,384	
82	Charities deposit fund		245	
2	Bank deposit account		2	
22,876				17,631
34,560	**Total Income**			29,798
(26,158)	*Less:* **Expenditure**			(24,755)
8,402				5,034
(3,137)	*Less:* Provision for diminution in value of certain investments			(3,370)
£ 5,265	Surplus for the year			£ 1,673

1990 £	£	Expenditure	£	£
		Meeting costs, sectional & general expenditure:		
	2,209	Hire of halls and rooms	2,063	
	1,468	Lecturers' fees and expenses, sectional expenses etc.	1,955	
	193	Postage and telephone	164	
	115	Stationery	181	
	1,285	Services (Auditors' fees, insurance, etc.)	1,481	
	700	Honoraria and expense allowances	700	
	1,860	Depreciation	611	
	—	Bank charges	228	
7,830				7,383
		Publications		
		Printing and expenses:		
	5,786	*London Naturalist* **68**	6,621	
	4,290	*London Bird Report* **53**	3,500	
	10,076		10,121	
	1,060	*Programme*	1,064	
	2,593	*Bulletin* and *Newsletter*	2,408	
	2,011	Mailing	2,442	
15,740				16,035
1,138		Library		761
814		Publicity		475
636		Grants, including contributions to other organisations		101
£26,158		Total expenditure for the year		£24,755

Balance Sheet as at 30 June 1991

1990 £	1990 £		£	£
		Fixed Assets acquired after 30 June 1985, excluding library books:		
	10,342	Computers, including ancillary equipment and initial programming costs	10,342	
	143	Library equipment	143	
	1,415	Other indoor equipment	1,588	
	413	Bat detectors	413	
	2,158	Bookham hut	2,158	
	14,471		14,644	
	(12,887)	*Less:* Depreciation	(13,498)	
1,584				1,146
	217,958	*Quoted Investments* at cost	218,731	
	(7,334)	*Less:* Provision	(10,704)	
210,624				208,027
		(Market Value £326,387 – 1990: £336,447)		
		Current Assets		
		Funds at bank and on deposit;		
	4,451	National Westminster Bank PLC	12,832	
	1,550	Charities deposit fund	2,750	
	6,001		15,582	
	236	Cash in hand	525	
	147	Payments in advance and other debtors	136	
	829	Tax recoverable on investment income	2,920	
	325	Stationery stocks	425	
7,538				19,588
		Less: Current Liabilities		
	—	Custodian's charges	(3,531)	
	(25)	Contributions to bat boxes	(25)	
	(1,054)	General liabilities and accrued expenditure	(4,865)	
(1,079)				(8,421)
£218,667		Total net assets		£220,340
		Representing: *General Fund* (incorporating the Hindson and Castell Bequests)		
213,402		Balance at 30 June 1990		218,667
5,265		Surplus for the year		1,673
£218,667				£220,340

D. BEVAN President
M. J. WEST Treasurer
Dated: 25 November 1991

Report of the Auditors to the Members of the London Natural History Society

We have audited the financial statements in accordance with auditing standards.

In our opinion these statements give a true and fair view of the income and expenditure of the Society for the year ended 30 June 1991 and of its assets, liabilities and fund balances at that date.

4 London Wall Buildings
LONDON EC2M 5NT
25 November 1991

FRASER & RUSSELL
Chartered Accountants

Note to the Accounts

Accounting Policies

a) Subscriptions, which are collected on a calendar basis, continue to be brought in as received. No account is taken of subscriptions in arrears until received.

b) Investment Income is credited to the Income and Expenditure Account together with the income tax credit receivable.

c) Provision is made for all material debtors, prepayments, creditors and accruals with the exception of subscription income (see note a above).

d) Depreciation is provided on fixed assets at rates calculated to write off the cost of each asset over its expected useful life as follows:–

Computer equipment — 25%
Other equipment — 20%

See also the Treasurer's Notes on page 8.

Book Reviews

Conservation Pieces. By Humphrey Mackworth-Praed. Packard Publishing, Chichester. 1991. 220 pp., paperback. £9.95. ISBN 1-85341-046-2. Available post free from the author at Tunbarr, Headley, Epsom, Surrey KT18 6PQ.

This is an unusual and enjoyable book which will have a particularly strong appeal to those involved in practical wildlife conservation work. The book consists of twenty-three 'pieces' describing different aspects of the author's work in conservation over the past thirty years. This has been remarkably varied, involving work for The National Trust, several county wildlife trusts, and a number of other voluntary organizations. Each chapter is illustrated by excellent colour photographs. Many of these show 'work in progress' and usefully complement the text. Others depict some of the plants and animals whose conservation is described. A great variety of conservation work is covered. This ranges from the mundane, but necessary, process of repairing the famous Zig-Zag path up Selborne Hanger, to the problems of protecting the fragile habitat of the Glanville fritillary butterfly on the Isle of Wight. Butterfly conservation indeed forms an important linking theme through much of the book and is evidently a particular interest of the author. The conservation of certain rare plants is also discussed. One chapter, for example, describes the difficulties encountered in providing for the complex ecology of the star-fruit *Damasonium alisma* in certain ponds on a Surrey common. Another, by contrast, outlines attempts to eradicate from a National Trust property the giant knotweed *Fallopia sachalinensis* – known locally as the giant rhubarb. But this is emphatically not a textbook – it is intended to inform and amuse and it succeeds admirably. There is a useful glossary at the end where I discovered, for example, that a 'chrome' is a 'long-handled tool with tines bent at right angles in their middle, for use as a draghook. Unpleasant to travel with; best on a roofrack.' These formidable implements had been mentioned while describing the control of water soldier which was choking a Surrey pond.

Most of the book concerns conservation work in south-east England, but there are also accounts of a visit to arctic Scandinavia, another to Tenerife, and a third describes an alpine meadow and its butterfly populations. As light relief, a further two chapters offer some amusingly cynical advice for wardens and countryside managers on how to create a maximum impression for the minimum of effort. Thus, the first rule for wardens is 'always carry a small tool such as a billhook or spanner. This shows that you are working.'

The author's many colleagues and collaborators are referred to by their Christian names only and I enjoyed speculating on who was who! Several members of the LNHS appear to figure quite prominently under this disguise.

I found this an informative and entertaining book which I can highly recommend to all interested in the many facets of wildlife conservation.

David Bevan

The Handbook of British Mammals. Third edition. Edited by Gordon B. Corbet and Stephen Harris. Blackwell Scientific Publications, Oxford, for The Mammal Society. 1991. 588 pp. £49.50. ISBN 0 632 01691 4.

This new edition of the standard work on British mammals has been commissioned by The Mammal Society and has been completely revised and extensively rewritten to include the very latest data. Although in many respects a reference book, it can be read from beginning to end by any interested student of natural history. It contains a check-list of species, chapters on the history of our fauna, habitats and their mammalian communities, and British mammals and the law. The systematic accounts list all the mammalian orders and give complete biological details, descriptions and other such information as footprints and tracks, food, etc., species by species. There are also excellent distribution maps. Obviously with such orders as the Cetacea, Pinnipedia and Chiroptera, the data given are approximate to each species, but are still equally comprehensive.

In the appendices we are given fascinating information regarding extinct species, ephemeral introductions and escapes. All sections of the book contain extensive references, whilst there is a useful glossary and list of abbreviations at the end.

I have no hesitation in recommending this book, not only to committed naturalists, but to all others interested in our fauna: it is a superb natural history, crammed with biological detail, to be read avidly from cover to cover.

R. V. Goulding

Copepod Evolution. By Rony Huys and Geoffrey A. Boxshall. The Ray Society, London. 1991. 468 pp., A4. £50. ISBN 0 903874 21 0.

'Students of copepods have traditionally belonged to one of five more or less separate interest groups, i.e. the marine plankton, the freshwater plankton, sediment inhabiting forms, parasites of fishes and associates of invertebrate hosts.' So commences the Preface of the present volume. Copepods are small crustaceans that have colonized virtually every aquatic habitat from the deep-sea floor to the high Himalayas. They are by far the dominant animal group in marine plankton and often in freshwater plankton also. The variety of free-living forms is only part of the copepod success story, since they have become associates or parasites of virtually every animal phylum from sponges and cnidarians, up to chordates, including fish and mammals. Some idea of their interest and importance in the ecosystem is shown by the fact that since 1850 no less than 10 previous Ray Society publications have dealt with copepods.

As the title states, the main theme of the volume is evolution, and this is presented in a masterly way. It is clear, concise and instructive and is illustrated throughout by numerous detailed line drawings and electron-microscope photographs. One has no need to be a specialist on Crustacea to benefit from delving into it. The Introduction covers habitats, the importance of copepods from an ecological aspect, as pests, as disease vectors, and in biological control, the fossil record, their characteristics and their appendage structure. The next and largest section of over 250 pages discusses in detail the 10 recognized orders of the group. This is followed by a 50-page chapter on evolutionary trends within the Copepoda and then a new phylogeny of the group following summaries of existing phylogenies. It concludes with a key to the orders and a classification to family level. The bibliography contains over 300 references and is followed by appendices on the material studied, methods of study and a glossary.

This volume is Number 159 of the series started by The Ray Society on its foundation in 1844 and whose aims are 'the promotion of Natural History by the printing of original works in Zoology and Botany; of new editions of works of established merit, of rare Tracts and MSS; and of translations and reprints of foreign works; which are generally inaccessible'. The publication of learned books on natural history, with special but not exclusive reference to the British fauna and flora, remains the object of the Society, and readers familiar with these works will appreciate that they possess a general appeal on account of the interest of many authors in morphology, ecology and history as well as in taxonomy.

Membership of The Ray Society is open to any person willing by subscription (currently £4 per annum) to promote its work. Members are entitled to purchase one copy of each new volume at a concessionary price and may also purchase earlier works at a discount. Details of membership may be obtained by writing to The Honorary Secretary, The Ray Society, c/o The Natural History Museum, Cromwell Road, London SW7 5BD. Non-members can purchase Ray Society publications at the Museum's bookshop.

K. H. Hyatt

Book Reviews

Nature Conservation in Ealing. By Meg Game, John Archer and Matthew Frith. London Ecology Unit, Ecology Handbook No. 16. 1991. A4, 96 pp. £4.95 at major bookshops, or direct from the LEU, Bedford House, 125 Camden High Street, London NW1 7JR at £6.20 post free. ISBN 1-871045-12-6.

This is No. 16 in the series 'A Nature Conservation Strategy for London'. The introduction tells us that it is intended as a guide to planners and land-managers on how best to further nature conservation in the Capital, for example, through policies in Unitary Development Plans, in development control, and in the way open spaces are managed. Additionally, I think that it would be of some general use to anybody wishing to look at wildlife within the Borough.

To achieve its stated purpose a wealth of detail is provided which is categorized under specific sections, the first of these dealing with the landscape and geology of the area, this being supported by a schematic plan: there then follows a historical review.

A further section contains comprehensive descriptions of numerous sites in Ealing which are of importance to wildlife and subdivided into those of Metropolitan Importance, of Borough Importance, and of Local Importance. The detail for each site covers types of habitat, summarises the natural history content, and also gives a considerable amount of other relevant information. Some of these descriptions include a locality map, but as the backgrounds are rather faintly printed they are not all that clear. However, there is always a grid reference to enable the places to be identified.

Another item of interest is a list of such sites which are also important to Ealing, but lie within the boundaries of adjacent boroughs and which could be included in any visit being made to the area.

Comment is made with regard to Education Initiative, and to the roles of the Borough Council and voluntary organizations, for which details are given. References are also given to cartographical sources and for further reading. The publication is enhanced by 12 pages of attractive, coloured photographs relating to subjects and sites in the text, plus six full-page, four-colour maps showing both the Borough and its environs, for example, 'Nature conservation sites important to the London Borough of Ealing and areas of deficiency', 'Wildlife corridors through Ealing', and 'The topography and rivers of Ealing'.

This handbook has a very informative content and should prove to be of interest and practical use to either resident or visitor who obtains enjoyment and pleasure from natural history, or who is concerned with conservation within the London Borough of Ealing.

P. A. Williams

Nature Conservation in Newham. By John Archer and Ian Yarham. London Ecology Unit. Ecology Handbook No. 17. 1991. A4, 74 pp. £4.95, as above. ISBN 1-871045-14-2.

Nature Conservation in Newham is Number 17 in the series of Ecology Handbooks produced by the London Ecology Unit. It is intended as a reference document for those in the position of determining development planning. As such it provides a summary of all the latest knowledge of wildlife communities and populations for all sites which have been identified as having importance for nature conservation within the Borough. It can also be used by the naturalist as a guide to sites of interest. Whoever is using it, the style of presentation is extremely readable with English species names used wherever possible, the scientific names being given either in brackets or in an appendix.

The Introuction states the Borough Council's awareness of the importance of open areas and wildlife to the population and that it works to support, encourage and enhance nature conservation in its policies. This relates particularly to development planning. It is pointed out that the London Docklands Development Corporation fulfills the role of planning authority in part of the south of the Borough and that this body is seeking to offset the loss of disused industrial sites which were acquiring their own natural communities by the provision of new wildlife habitats.

The first part of the book gives background information on the Borough, opening with a chapter on the natural landscape and geology. This is supported by two maps, one showing the Borough in relation to neighbouring areas and the main wetland and open space sites in Newham and surrounding boroughs. The second map is a simple geological map showing the four main underlying strata. Next comes a chapter giving an interesting potted history of the area, explaining how and why the landscape developed as it has. There is then a chapter giving brief descriptions of the various main habitat types to be found with a map showing the sites documented by the 1984 GLC Wildlife Habitat Survey in and around Newham. Areas of the Borough lacking in easy access to main sites of interest are also identified. The last two chapters in the first section explain the role of the Borough Council in planning, the management of its open spaces and education, and the role of voluntary organisations.

The main part of the book consists of descriptions of the various sites of nature conservation interest. These are divided into sites of importance at Metropolitan, Borough and Local level, with the middle category being divided into two. Each site is described succinctly with details of its exact location, its designated status, if any, a short history of the site where this is relevant to its present condition and then a description of the habitat, any unusual or significant communities of plants or animals and individual species for which the site is valuable. A grid reference is given and the area of the site shown. In the vast majority of cases this works well with sufficient information being provided without it becoming a catalogue of species. For a few sites, however, the details of access, or lack of it, were either non-existent or insufficient. Also the entry for the River Lea system, Stratford Marsh and Mill Meads would have benefited from the provision of a site map as the written descriptions of the numerous waterways may well be confusing to people unfamiliar with the area. This is followed by a list of sites in neighbouring boroughs which are of nature conservation interest to the people of Newham.

The book contains 11 pages of well reproduced, attractive colour photographs showing sites, small sections of habitats and individual plants and animals to be found there. There are also maps showing green corridors, railway land of nature conservation value and the locations of all the sites listed. There is a very comprehensive bibliography.

The London Ecology Unit is to be congratulated on producing such an informative book and presenting it in such an accessible way. To my mind it is a must for anyone with an interest in nature conservation in Newham, or east London generally, at whatever level.

MIKE DENT

We have received three further London Ecology Unit Handbooks, No. 18, *Nature Conservation in Kingston-upon-Thames*, No. 19, *Nature Conservation in Islington* and No. 20, *Nature Conservation in Barking and Dagenham*. Ed.

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The London Naturalist

Instructions to contributors

Submission of papers

Papers relevant to the natural history and archaeology of the London Area should be submitted to the editor, Mr K. H. Hyatt, c/o Department of Zoology, British Museum (Natural History), Cromwell Road, London SW7 5BD, before the end of January if they are to be considered for publication in the same year. However, the editor will be pleased to be contacted at any time to discuss possible contributions. Manuscripts should be typed, with double spacing and wide (three cm) margins, on one side of the paper only. Authors must retain a duplicate copy. Papers should include at the beginning an abstract, summary, or synopsis. Sheets must be numbered.

Text

Locality spellings should follow the latest editions of the maps published by the Ordnance Survey. Capitalization should be kept to a minimum. Common names of animals and plants must begin with lower-case initials, and Latin names of genera and species must be underlined. When both common and Latin names are given there should be no brackets or commas separating them. Genus names should appear in full where first used within each paragraph. When scientific names are taken from a standard work, which must be cited, authorities should be omitted. In descriptive matter numbers under 10 should be in words, except in a strictly numerical context. Dates in the text should follow the logical sequence of day, month, year, i.e. 25 December 1971, but in lists as 25.xii.1971. Measurements should be in metric and follow the SI system (Système International d'Unités), with imperial equivalents in parentheses where appropriate. There should be no full point following Dr, Mr, Mrs or St. Lists should be in systematic, alphabetical or numerical order. Hyphens should not appear at the ends of lines. **Tables should be typed on separate sheets at the end of the text. Word-processed text should not use italic, bold or compressed typeface.**

References

Reference citation should be based on the Madison rules (in *Bull. Torrey bot. Club* **22:** 130-132 (1895)), except that a colon should always precede a page number. Capitalization in titles of books and papers in journals should be kept to a minimum. Journal titles should follow the abbreviations in the *World List of Scientific Periodicals* and be underlined. Book titles should also be underlined. Examples are as follows:

In text:
Meadows (1970 : 80) or (Meadows 1970).
In references:

MEADOWS, B. S. 1970. Observations on the return of fishes to a polluted tributary of the River Thames 1964-9. *Lond. Nat.* **49:** 76-81.

MELLANBY, K. 1970. *Pesticides and pollution*. Ed. 2. Collins, London.

WHITE, K. G. 1959. Dimsdale Hall moat, part II. *Trans. a. Rep. N. Staffs. Fld Club* **92:** 39-45.

Illustrations

Distribution maps should be submitted in the form of a Recording Map with symbols in Indian ink and stencilled or by transfers e.g. 'Letraset'. Solid dots are used to indicate contemporary or recent presence, circles for old records and crosses (not pluses) for other information, such as introduced species. The caption should be written outside the frame of the map and will be set up by the printer.

Line drawings should be in Indian ink on white card or tracing paper, larger than the printed size, but no larger than A4. Place names, etc., must be produced with stencils or Letraset. Captions should be separate as they will be set up by the printer, but keys that include special characters should be included within the borders of the figure.

Photographs should be glossy black-and-white prints, of good contrast, preferably plate or half-plate in size, or, following consultation with the editor, in the form of colour transparencies, either 35 mm or larger.

Proofs

Proofs will be sent to authors for scrutiny, but only essential corrections can be made at that stage.

Offprints and reprints

Up to 25 free, unbacked offprints will be supplied on request. Additional copies may be purchased if ordered when the proofs are returned.

Backed and folded, wire-stitched reprints, with or without covers, may be purchased by authors following consultation with the editor.

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